# **Pharmacy Administration System Technical Specification**

Overview:

A comprehensive Scrypto administration application for a pharmacy/group would significantly enhance operational efficiency, streamline management processes, and improve overall performance across multiple branches.

Core Modules

1. Operations Management
   1. Branch Management
   2. Dashboard for overview of all branches
   3. Individual branch performance metrics
   4. Inventory status across branches
   5. Staff allocation and scheduling
   6. Inventory Control
   7. Real-time stock levels
   8. Automated reordering system
   9. Expiry date tracking
   10. Inter-branch stock transfer management
   11. Order Processing
   12. Centralized order management system
   13. Prescription verification and processing
   14. Order status tracking and updates
2. Delivery Management
   1. Route Optimisation
   2. Intelligent routing algorithms for efficient deliveries
   3. Real-time tracking of delivery personnel
   4. Delivery time estimation and customer notifications
   5. Delivery Personnel Management Scheduling and shift management
   6. Performance tracking and analytics
   7. Mobile app for delivery staff to manage orders and routes
3. User Management
   1. Role-Based Access Control
   2. Define user roles (admin, pharmacist, delivery staff, etc.)
   3. Set permissions for each role
   4. Manage user accounts and access rights
   5. Onboarding System
   6. Streamlined process for adding new staff
   7. Training module with required certifications tracking
   8. Integration with HR systems for employee data management
4. Security and Compliance
   1. Data Protection
   2. Encryption of sensitive patient and business data
   3. Regular security audits and vulnerability assessments
   4. Compliance with healthcare data protection regulations (e.g., GDPR, HIPAA)
   5. Audit Trails
   6. Logging of all user actions within the system
   7. Reporting tools for compliance and internal audits
5. Marketing and Promotions
   1. Campaign Management
   2. Create and manage marketing campaigns
   3. Target specific customer segments
   4. Track campaign performance and ROI
   5. Loyalty Program Design to work with external and internally implement customer loyalty schemes, variety of points based, voucher based, awards-based schemes
   6. Track customer points and rewards
   7. Analyse customer behaviour and preferences
6. Analytics and Reporting
   1. Business Intelligence Dashboard
   2. Key performance indicators for all aspects of the business
   3. Customizable reports and data visualization tools Predictive analytics for inventory and sales forecasting

## 1. System Architecture Requirements

### 1.1 Multi-tenancy Support

* Implement tenant isolation at database and application levels for location ID
* Support custom branding and configuration per tenant or groups of tenants (to cater for independents or chains)
* Enable tenant-specific business rule configurations (opening hours, staff capacity, resourcing, based on potential lease restrictions on the property)
* Maintain separate audit logs per tenant and tenant locations

### 1.2 Integration Requirements

* RESTful API endpoints for all core functionalities
* OAuth2/OpenID Connect authentication
* Support for standard healthcare data formats (HL7, FHIR)
* Webhook system for real-time event notifications
* ETL pipelines for data migration

## 2. Core Functionalities and Validation Rules

### 2.1 Inventory Management

**Required Functionalities:**

* Real-time stock tracking across locations
* Automated reordering based on configurable thresholds
* Batch and expiry tracking
* Inter-branch transfer management

**Validation Rules:**

* Stock levels cannot go negative or can be parameterised
* Reorder points must account for lead time (based on indicative lead times by supplier SLA-manual data entry)
* Expiry dates must be future dates
* Transfer quantities cannot exceed available stock
* Maintain audit trail of all stock movements subject to access control restriction.

### 2.2 Order Processing

**Required Functionalities:**

* Digital prescription processing
* Order status workflow management
* Integration with payment systems
* Automated dispensing system integration

**Validation Rules:**

* Verify prescription authenticity
* Check drug interactions
* Validate insurance coverage
* Ensure proper authorisation levels for controlled substances
* Maintain complete chain of custody

### 2.3 Delivery Management

**Required Functionalities:**

* Dynamic route optimisation
* Order update progress notifications to designated delivery partner (if applicable)
* Order scheduling
* Real-time delivery tracking
* Proof of delivery capture
* Temperature monitoring for sensitive medications (delivery rules apply for delivery partner selection)

**Validation Rules:**

* Validate delivery addresses against past orders, patient data, designated delivery address, recipient (authorised signatory for acceptance)
* Check delivery time windows
* Verify driver credentials
* Ensure proper handling conditions
* Confirm customer identity at delivery

### 2.4 User Management

**Required Functionalities:**

* Role-based access control (RBAC)
* Multi-factor authentication (MFA)
* User activity monitoring
* Training and certification tracking

**Validation Rules:**

* Enforce password complexity, frequency of validity
* Verify professional licenses
* Track certification expiration, set reminders for renewal
* Implement session timeout
* Regular access review requirements

### 3. Business Rules Engine

### 3.1 Configurable Parameters

* Reorder thresholds
* Delivery zones (distance, radius, postcode, applicable unit of measure)
* Pricing rules
* Promotion eligibility
* Loyalty program rules
* Access restrictions

### 3.2 Rule Sets

* Drug dispensing protocols
* Insurance processing rules
* Compliance requirements
* Marketing campaign rules
* Inventory allocation rules

## 4. Integration Points

### 4.1 Required External Systems

* Electronic Health Records (EHR)
* Payment processors
* Insurance providers
* Supplier systems
* Regulatory reporting systems
* Scrypto core modules (data archive, BI & Analytics)

### 4.2 Integration Methods

* REST APIs
* SOAP services
* HL7 interfaces
* SFTP file transfers
* Message queues

## 5. Reporting and Analytics

### 5.1 Required Reports

* Inventory analytics
* Sales performance
* Delivery metrics
* Compliance reports
* Customer analytics
* Staff usage records

### 5.2 Data Requirements

* Real-time dashboards
* Historical trending
* Predictive analytics
* Custom report builder, parameterised and standard report pack, on-demand or scheduled
* Export capabilities *[by authorised users and restricted fields in line with regulations applicable (must have as patient data records will be critical for acceptance in the wider market-suggest investigating ISO security standards and certification as a must have)*]

## 6. Security and Compliance

### 6.1 Security Requirements (potential to use a private medical blockchain)

* Data encryption at rest and in transit
* Regular security audits
* Penetration testing
* Intrusion detection
* Disaster recovery

### 6.2 Compliance Requirements

* POPIA/HIPAA compliance
* GDPR compliance
* PCI DSS compliance
* Localised SAPC pharmacy board regulations (where applicable)
* Drug enforcement regulations

## 7. Performance Requirements

### 7.1 System Performance (Initial-MVP)

* 99.9% uptime SLA
* Offline capability tbd for reduced reliance on intermittent power/network outages
* Sub-second response time for critical operations
* Support for 1000+ concurrent users
* Handle 100,000+ transactions per day
* Data retention longevity in line with relevant policy applicable (GDPR, HIPAA, POPIA)

### 7.2 Scalability Requirements

* Horizontal scaling capability
* Load balancing
* Caching strategy (stock, medication database, medicine lists-refer to Avisha on where to access these. Once done there is potential to serve up page on demand for faster response if/when in power/network outage/switchover for DR/Recovery
* Database partitioning
* Microservices architecture

## 8. Implementation Checkpoints

### 8.1 Pre-deployment

* Data migration plan
* User training program
* Integration testing
* Performance testing
* Security audit

### 8.2 Deployment

* Infrastructure setup
* Database initialisation
* Application deployment
* Integration activation
* User onboarding

### 8.3 Post-deployment

* Performance monitoring
* User feedback collection
* System optimisation
* Documentation updates
* Support process establishment

## 9. Success Criteria

### 9.1 Technical Metrics

* System uptime > 99.9%
* API response time < 200ms
* Zero critical security incidents
* 100% data accuracy
* < 0.1% error rate in transactions

### 9.2 Business Metrics to analyse

* reduction in inventory costs
* improvement in delivery efficiency
* reduction in manual processes
* order accuracy
* customer satisfaction
* staff usage

## 10. Error Handling and Exception Management

10.1 Prescription Error Management UC-PE-01: Illegible Prescription Processing

Primary Actor: Pharmacist Scenario:

* System receives unclear prescription scan
* Pharmacist flags prescription for verification
* System initiates verification workflow:
* Contacts prescribing physician through secure messaging
* Documents communication attempts
* Logs verification process
* Records final interpretation
* Updates prescription record with verification details
* Notifies relevant staff of resolution

Validation Points:

* Verify prescriber contact details
* Log all communication attempts
* Document interpretation rationale
* Maintain verification audit trail

UC-PE-02: Prescription Correction Workflow

Primary Actor: Pharmacy Staff Scenario:

* Error identified in filled prescription
* System initiates correction protocol:
* Freezes dispensing
* Notifies pharmacist
* Records error details
* Generates incident report
* Pharmacist reviews and approves correction
* System updates records and inventory
* Generates corrected documentation

Validation Points:

* Log error details
* Track correction approval
* Update patient records
* Maintain correction history

10.2 Return and Refund Management UC-RF-01: Medication Return Processing

Primary Actor: Pharmacy Staff Scenario:

* Customer initiates return
* System checks:
  + Original purchase details
  + Return eligibility
  + Product condition
  + Storage conditions during possession
* Generates return authorisation
* Updates inventory if applicable
* Initiates disposal process if required
* Records return reason for analytics

Validation Points:

* Verify purchase history
* Check return policy compliance
* Validate product integrity
* Document disposal requirements

UC-RF-02: Refund Processing

* Primary Actor: Pharmacy Staff Scenario:
* System validates refund eligibility:
  + Original payment method
  + Time since purchase
  + Product condition
* Return authorisation
* Calculates refund amount including:
  + Original payment
  + Insurance claims
  + Restocking fees if applicable
* Processes refund to original payment method
* Generates refund documentation
* Updates financial records

Validation Points:

* Verify payment details
* Check refund authorisation
* Validate amount calculation
* Confirm transaction completion

10.3 Patient Communication Management UC-PC-01: Automated Patient Notifications

Primary Actor: System Scenario:

* System identifies notification trigger:
* Prescription ready
* Refill due
* Medication interaction alert
* Appointment reminder
* Checks patient communication preferences
* Generates appropriate message
* Sends through preferred channel
* Tracks delivery and response
* Escalates if necessary

Validation Points:

* Verify contact information
* Check communication consent
* Validate message content
* Monitor delivery status

UC-PC-02: Patient Query Management

Primary Actor: Patient Support Staff Scenario:

* System receives patient inquiry
* Categorises query type:
* Prescription status
* Medical advice request
* Administrative Billing
* Routes to appropriate staff
* Tracks response time
* Maintains communication thread
* Archives resolution

Validation Points:

* Verify patient identity
* Check query classification
* Monitor response times
* Document resolution

10.4 Patient Record Management UC-PR-01: Patient Profile Updates

Primary Actor: Healthcare Provider Scenario:

* System receives profile update trigger:
* New prescription
* Changed insurance
* Updated contact info
* New allergy information
* Validates update source
* Applies changes to profile
* Propagates updates to connected systems
* Notifies relevant staff
* Logs change history

Validation Points:

* Verify update authority
* Check data consistency
* Validate information sources
* Maintain audit trail

UC-PR-02: Medical History Access

* Primary Actor: Authorised Healthcare Provider Scenario:
* Provider requests patient history
* System verifies access rights
* Retrieves comprehensive record:
* Prescription history
* Allergies and reactions
* Previous interactions
* Insurance claims
* Logs access details
* Presents information in required format

Validation Points:

* Verify access authorisation
* Check data completeness
* Validate information accuracy
* Record access details

**10.2 Expanded Access Control Matrix**

**Internal Pharmacy Staff (South African Classifications)**

| **Function** | **Responsible Pharmacist** | **Pharmacy Manager** | **Pharmacist** | **Post-Basic Pharmacist Assistant** | **Basic Pharmacist Assistant** | **Pharmacist Intern** | **Learner Basic PA** | **Support Staff** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Patient Records - Full | Yes | Yes | Yes | Limited | View Only | Supervised | View Only | No |
| Patient Records - Basic | Yes | Yes | Yes | Yes | Yes | Yes | Limited | No |
| Dispense Schedule 1-2 | Yes | Yes | Yes | Yes | Yes | Supervised | No | No |
| Dispense Schedule 3-4 | Yes | Yes | Yes | Yes | No | Supervised | No | No |
| Dispense Schedule 5-6 | Yes | Yes | Yes | No | No | Supervised | No | No |
| Inventory Management | Full | Full | Limited | Count Only | Count Only | View Only | No | No |
| Financial Operations | Yes | Yes | No | No | No | No | No | No |
| Clinical Interventions | Yes | Yes | Yes | Limited | No | Supervised | No | No |
| Training Management | Yes | Yes | Limited | No | No | No | No | No |
| Staff Supervision | Yes | Yes | Limited | Limited | No | No | No | No |

**Administrative and System Access**

| **Function** | **System Admin** | **Third Party Super User** | **Finance Manager** | **Marketing Manager** | **Help Desk** | **Support Staff** |
| --- | --- | --- | --- | --- | --- | --- |
| System Configuration | Full | Limited | No | No | No | No |
| User Management | Full | Limited | No | No | Limited | No |
| Report Generation | Full | Full | Financial Only | Marketing Only | Limited | Basic |
| Audit Logs | Full | View Only | Department Only | No | No | No |
| Emergency Override | Yes | Limited | No | No | No | No |
| Database Access | Full | Limited | No | No | No | No |

**Third Party Access Levels**

| **Function** | **Super User** | **Support Agent** | **Integration Partner** | **Vendor** | **Auditor** |
| --- | --- | --- | --- | --- | --- |
| System Access Level | High | Medium | Limited | Limited | Read Only |
| Data Access | Limited | Limited | Specific Only | No | Full |
| Configuration Rights | Limited | No | Integration Only | No | No |
| Support Tools | Full | Limited | No | No | No |
| Report Access | Full | Limited | Specific Only | No | Full |
| Emergency Access | Yes | No | No | No | No |

**10.3 Role-Specific Restrictions and Requirements**

**Responsible Pharmacist**

* Must maintain valid SAPC registration
* Full access to all pharmacy operations
* Authority to override system controls
* Responsible for all regulatory compliance
* Can delegate specific authorities

**Pharmacy Manager**

* Reports to Responsible Pharmacist
* Full operational access
* Limited override capabilities
* Financial management access
* Staff management rights

**Third Party Super User**

* Requires specific security clearance
* Access limited to contracted scope
* All actions logged and audited
* No direct patient data access
* Cannot modify core configurations

**Post-Basic Pharmacist Assistant**

* Can dispense under supervision
* Limited patient record access
* Basic inventory management
* No financial access
* Required supervision logging

**Basic Pharmacist Assistant**

* Very limited dispensing rights
* Basic patient information only
* Counting and receiving stock
* No clinical intervention rights
* Supervised activities only

## 11.2 Disaster Recovery Procedures Immediate Response (0-15 minutes)

Incident Assessment

Identify affected systems

Determine incident severity

Activate response team

Initialise emergency protocols

Critical System Recovery

Activate backup systems

Initialise failover procedures

Enable emergency access protocols

Begin data restoration

Short-term Recovery (15-60 minutes)

* Business Continuation
* Implement manual procedures
* Activate emergency communication
* Enable offline processing
* Begin customer notification
* System Stabilisation
* Verify data integrity
* Test critical functions
* Establish temporary workflows
* Monitor system status

Long-term Recovery (1-24 hours)

* Full System Restoration
* Complete data recovery
* Verify all systems
* Resume normal operations
* Document incident
* Post-Incident Analysis
* Review response effectiveness
* Update procedures
* Implement improvements
* Train staff on lessons learned

11.3 Business Impact Analysis Potential Impact Areas

Operational Impacts

* Prescription processing delays
* Customer service disruption
* Inventory management issues
* Delivery scheduling problems
* Staff productivity loss
* Financial Impacts
* Lost sales revenue
* Emergency procedure costs
* Recovery operation expenses
* Overtime labour costs
* Potential liability issues
* Regulatory Impacts
* Compliance violations
* Reporting delays
* Documentation gaps
* Audit trail disruption
* Legal exposure

Customer Impacts

* Service delays
* Treatment interruptions
* Communication issues
* Trust degradation
* Satisfaction decrease

Business Benefits of Proper DR/BC Planning

* Operational Benefits
* Minimised downtime
* Maintained productivity
* Protected revenue streams
* Preserved data integrity
* Enhanced reliability

Competitive Advantages

* Improved customer trust
* Enhanced reputation
* Reduced risk profile
* Better compliance status
* Increased resilience
* Financial Benefits
* Reduced recovery costs
* Lower insurance premiums
* Protected revenue
* Minimised losses
* Faster recovery

## 12. System Monitoring and Support

### 12.1 Error Detection and Resolution

#### UC-ED-01: Critical System Error Detection

**Primary Actor:** System Monitor **Scenario:**

1. System detects critical error:
   * Database connectivity failure
   * API service disruption
   * Security breach attempt
   * Hardware malfunction
2. Initiates immediate response:
   * Logs detailed error information
   * Triggers alerts to IT team
   * Activates failover systems
   * Starts automated recovery
3. Maintains service availability
4. Generates incident report

**Validation Points:**

* Error classification accuracy
* Alert delivery confirmation
* Recovery initiation timing
* Service continuity verification

#### UC-ED-02: Data Integrity Error Management

**Primary Actor:** Database Administrator **Scenario:**

1. System detects data anomaly:
   * Inconsistent inventory counts
   * Mismatched transaction records
   * Corrupt patient data
   * Invalid prescription records
2. Initiates data validation:
   * Identifies affected records
   * Traces error source
   * Creates backup of affected data
   * Implements correction plan
3. Executes recovery procedure
4. Verifies data integrity
5. Documents incident

**Validation Points:**

* Error scope identification
* Backup verification
* Correction accuracy
* Post-recovery validation

### 12.2 Data Quality Management

#### UC-DQ-01: Automated Data Validation

**Primary Actor:** System **Scenario:**

1. System performs scheduled data check:
   * Field format validation
   * Relationship integrity
   * Business rule compliance
   * Duplicate detection
2. Identifies anomalies
3. Categorises issues by severity
4. Generates validation report
5. Initiates correction workflows

**Validation Points:**

* Validation rule accuracy
* Issue categorisation
* Correction priority
* Resolution tracking

#### UC-DQ-02: Manual Data Correction

**Primary Actor:** Data Administrator **Scenario:**

1. Reviews validation reports
2. Analyses correction requirements
3. Creates correction plan
4. Implements changes
5. Verifies corrections
6. Updates validation rules if needed

**Validation Points:**

* Correction authorisation
* Change documentation
* Post-correction validation
* Rule update verification

## 13. Business Continuity

### 13.1 Disaster Recovery Scenarios

#### UC-DR-01: Complete System Failure

**Primary Actor:** IT Operations Manager **Scenario:**

1. System experiences catastrophic failure
2. Disaster recovery plan activated:
   * Alert key stakeholders
   * Activate backup systems
   * Initialise failover procedures
   * Begin data recovery
3. Implement emergency procedures:
   * Switch to manual operations
   * Activate emergency communication
   * Deploy temporary systems
4. Monitor recovery progress
5. Validate system restoration
6. Document incident and response

**Validation Points:**

* Recovery plan execution
* Data integrity verification
* System restoration completion
* Documentation completeness

#### UC-DR-02: Natural Disaster Response

**Primary Actor:** Emergency Response Team **Scenario:**

1. Natural disaster affects operations
2. System initiates emergency protocols:
   * Activate remote operations
   * Switch to backup power
   * Secure critical data
   * Enable emergency access
3. Implement continuity procedures
4. Monitor facility conditions
5. Coordinate with emergency services
6. Maintain essential services

**Validation Points:**

* Emergency protocol activation
* Critical service maintenance
* Data security verification
* Communication effectiveness

### 13.2 Contingency Operations

#### UC-CO-01: Offline Operation Mode

**Primary Actor:** Pharmacy Staff **Scenario:**

1. Internet/System connectivity lost
2. Offline mode activated:
   * Local cache accessed
   * Emergency procedures enabled
   * Paper-based backup initiated
   * Critical operations prioritised
3. Track offline transactions
4. Maintain essential services
5. Prepare for synchronisation
6. Document offline period

**Validation Points:**

* Offline data accessibility
* Transaction tracking
* Service continuation
* Synchronisation readiness

#### UC-CO-02: Emergency Access Protocol

**Primary Actor:** Emergency Staff **Scenario:**

1. Emergency situation declared
2. System enables emergency access:
   * Override normal restrictions
   * Grant temporary permissions
   * Log all emergency actions
   * Enable crisis protocols
3. Monitor emergency operations
4. Track all overrides
5. Prepare for normal operations
6. Document emergency period

**Validation Points:**

* Emergency access control
* Override tracking
* Action logging
* Protocol compliance

### 13.3 Recovery and Restoration

#### UC-RR-01: System Restoration

**Primary Actor:** IT Recovery Team **Scenario:**

1. Begin restoration process:
   * Verify backup integrity
   * Initialise recovery systems
   * Restore critical data
   * Test core functions
2. Validate restored systems:
   * Data consistency checks
   * Function testing
   * Performance verification
   * Security validation
3. Resume normal operations
4. Document restoration process

**Validation Points:**

* Restoration completeness
* Data integrity
* System functionality
* Security compliance

#### UC-RR-02: Data Synchronisation

**Primary Actor:** System Administrator **Scenario:**

1. Post-disruption synchronisation:
   * Collect offline transactions
   * Verify data integrity
   * Resolve conflicts
   * Update master records
2. Validate synchronised data
3. Generate sync report
4. Update affected records
5. Notify stakeholders

**Validation Points:**

* Transaction completeness
* Conflict resolution
* Data accuracy
* Notification delivery

### 13.4 Business Impact Analysis

#### Impact Assessment Metrics

* Service disruption duration
* Data loss quantity
* Financial impact
* Customer impact
* Regulatory compliance
* Recovery costs

#### Recovery Priorities

* Critical service restoration
* Data recovery sequence
* System restoration order
* Communication priorities
* Resource allocation

14.1 Role-Based Training Requirements Pharmacy Staff

* Prescription processing procedures
* Inventory management
* Patient communication protocols
* Emergency procedures
* Compliance requirements
* Administrative Staff
* System configuration
* User management
* Security protocols
* Audit procedures
* Reporting requirements
* Support Staff
* Customer service procedures
* Communication protocols
* Basic troubleshooting
* Emergency procedures
* Escalation protocols

14.2 Training Delivery Methods

* Initial Training
* Classroom sessions
* Online modules
* Hands-on practice
* Role-specific workshops
* Certification tests
* Ongoing Training
* Refresher courses
* Update training
* Compliance updates
* Skill assessments
* Emergency drills