KICKAI Technical Documentation

AI-Powered Sunday League Football Team Management System

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1. Executive Summary

KICKAI is an intelligent football team management platform designed specifically for Sunday League teams. The system leverages artificial intelligence to automate routine team management tasks, streamline communications, and enhance team coordination through a sophisticated multi-agent architecture.

Key Value Propositions:

• Automated Team Management: AI agents handle player coordination, fixture management, and communications

• Multi-Team Scalability: Support for unlimited teams with isolated environments

• Real-time Communications: Instant messaging via Telegram with intelligent polling and announcements

• Data-Driven Insights: Comprehensive tracking of player availability, payments, and performance

• Cost-Effective: Local AI models reduce operational costs while maintaining high performance

Success Metrics:

■ BP Hatters FC: Fully operational with dedicated AI management

■ 7+ Message Types: Automated communications working

■ 4 AI Agents: Coordinated team management

■ Multi-team Ready: Architecture supports unlimited teams

■ Production Ready: System deployed and tested

2. System Overview

KICKAI operates on a multi-layered architecture that ensures team isolation, scalability, and maintainability. Each team operates in complete isolation with dedicated AI agents, database context, and communication channels.

High-Level Architecture:

The system is built on a foundation of CrewAI agents, Supabase database, and Telegram integration. Each team has its own isolated environment with dedicated resources and AI agents.

Core Principles:

• Team Isolation: Each team operates in complete isolation with dedicated resources

• AI-First Design: All operations are AI-driven with human oversight

• Scalable Architecture: Support for unlimited teams without performance degradation

• Real-time Communication: Instant messaging and notifications

• Data Integrity: Comprehensive audit trails and data consistency

3. Business Features

Team Management

The system provides comprehensive team management capabilities including player coordination, fixture management, and automated communications.

Player Coordination:

• Automated Player Registration: AI agents handle new player onboarding

• Availability Tracking: Real-time player availability for matches

• Contact Management: Centralized player contact information

• Role Assignment: Automatic assignment of team roles and responsibilities

Communication System

Telegram integration provides real-time communication with multiple message types for different purposes.

Message Types:

1. Basic Messages: General team announcements and updates
2. Interactive Polls: Team decision-making and voting
3. Availability Polls: Match availability confirmation
4. Squad Announcements: Starting XI and substitute notifications
5. Payment Reminders: Fee collection and payment tracking

4. System Architecture

Component Architecture:

The system is built on a layered architecture with clear separation of concerns:

• Presentation Layer: Telegram bots, CLI tools, and future web interface

• Application Layer: Multi-team manager, CrewAI framework, and task management

• Business Logic Layer: Telegram tools, Supabase tools, and team management

• Data Layer: Supabase PostgreSQL, local storage, and external APIs

Technology Stack:

Backend: Python 3.11+, CrewAI, Ollama, LangChain

Database: Supabase PostgreSQL with real-time features

External APIs: Telegram Bot API, Supabase API, Ollama API

Development: Git, Python venv, Docker (future)

5. Technical Components

Multi-Team Manager

The Multi-Team Manager orchestrates operations across multiple teams, ensuring isolation and resource management.

AI Agent System

• Team Manager: Overall team coordination and strategy

• Player Coordinator: Player management and availability

• Match Analyst: Fixture analysis and squad selection

• Communication Specialist: Team communications and announcements

Tool Layer

• Telegram Tools: Messaging, polls, announcements, payment reminders

• Supabase Tools: Player, fixture, and availability management

• Team Management Tools: Team configuration and bot management

6. Database Design

Core Tables:

• teams: Primary team information and multi-tenant isolation

• team_bots: Telegram bot credentials per team (one-to-one relationship)

• players: Player information with team association

• fixtures: Match scheduling with team-specific fixtures

• availability: Player availability tracking and payment status

Data Isolation Strategy:

• Row-Level Security: Database-level team isolation

• Team ID Filtering: Application-level data filtering

• Bot Isolation: Separate Telegram bots per team

• Agent Isolation: Team-specific AI agents

7. API Integration

Telegram Bot API:

• Authentication: Dynamic bot token and chat ID management

• Message Types: Text messages, polls, HTML formatting

• Rate Limiting: Request queuing and throttling (30 msg/sec)

• Error Handling: Comprehensive error management with retry logic

Supabase Integration:

• Connection Management: Secure client initialization

• Real-time Features: Live data synchronization

• Security Features: Row Level Security and audit logging

8. Multi-Team Architecture

Team Isolation Strategy:

Each team operates in complete isolation with dedicated resources, ensuring data privacy and operational independence.

Scalability Features:

• Horizontal Scaling: Add teams without performance impact

• Resource Isolation: Each team has dedicated resources

• Database Partitioning: Team-based data partitioning

• Load Balancing: Distributed agent execution

9. AI Agent System

Agent Communication Flow:

1. Task Assignment: Multi-team manager assigns tasks to agents
2. Tool Execution: Agents use appropriate tools for tasks
3. Result Processing: Results are processed and stored
4. Communication: Relevant information is communicated to teams
5. Feedback Loop: System learns from interactions

AI Model Configuration:

• Model: llama3.1:8b-instruct-q4_0

• Parameters: 8 billion parameters

• Quantization: Q4_0 (4-bit quantization)

• Context Window: 8K tokens

• Performance: Optimized for local inference

10. Deployment & Operations

System Requirements:

Minimum: 4 cores, 8 GB RAM, 20 GB SSD

Recommended: 8 cores, 16 GB RAM, 50 GB NVMe SSD

Network: Stable internet connection

OS: Linux/macOS/Windows

Environment Setup:

1. Clone repository and create virtual environment
2. Install dependencies: pip install -r requirements.txt
3. Setup database: Run kickai_schema.sql and kickai_sample_data.sql
4. Configure environment variables in .env file
5. Test installation with test_telegram_features.py

11. Security & Compliance

Data Security:

• Row Level Security: Team data isolation

• Encrypted Connections: TLS 1.3 for all connections

• Access Control: Role-based permissions

• Audit Logging: Comprehensive access logs

Compliance Considerations:

• GDPR Compliance: Data minimization and retention

• Data Localization: Local data storage options

• Consent Management: User consent tracking

• Data Portability: Export capabilities

12. Monitoring & Support

System Monitoring:

Performance Metrics: Response time, throughput, error rates

Business Metrics: Team activity, message volume, agent performance

Health Checks: Database, Telegram API, AI model status

Support Procedures:

Issue Resolution: Automated error detection and fix procedures

Maintenance Schedule: Daily health checks, weekly optimization

Troubleshooting: Comprehensive guides for common issues

13. Future Roadmap

Phase 1: Enhanced Features (Q1 2025)

- Payment Integration: Stripe/PayPal integration
- Advanced Analytics: Team performance insights
- Mobile App: Native mobile application
- API Documentation: Comprehensive API docs

Phase 2: Advanced AI (Q2 2025)

- Predictive Analytics: Match outcome predictions
- Player Recommendations: AI-powered squad selection
- Natural Language Processing: Advanced message understanding
- Multi-language Support: International team support

Phase 3: Enterprise Features (Q3 2025)

- League Management: Multi-team league support
- Advanced Reporting: Comprehensive analytics dashboard
- Integration APIs: Third-party system integration
- White-label Solution: Customizable branding

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