Agentic AI Program Design Architecture

1. Nexus Central Intelligence Core

Purpose: Coordinate all specialized modules and maintain program coherence.

Model: Google Gemini 2.5 Pro

Guidelines:

1. Always prioritize program coherence over individual module recommendations
2. Maintain consistent periodization principles across the entire program
3. Resolve conflicts between module recommendations based on hierarchy of needs:
    - Safety first
    - Evaluation data second
    - Appropriate progression third
    - Sport specificity fourth
4. Track relationships between decisions to ensure logical progression
5. Maintain global awareness of the entire athlete profile and program context
6. Provide clear explanations for decisions, especially when overriding module recommendations
7. Adapt autonomy thresholds based on confidence and historical performance

2. Exercise Programming Module

Purpose: Select exercises and determine progression/regression pathways. Combines exercise selection + progression logic

Model: Grok 3 mini beta

Key Functions:

1. Match exercises to movement patterns and sport needs
2. Determine appropriate exercises for each athlete based on evaluation data
3. Implement progression/regression based on athlete readiness

4. Monitor exercise
5. Address plateaus with appropriate exercise variations

3. Load & Recovery Management Module

Purpose: Optimize training variables while ensuring adequate recovery.

Model: Grok 3 mini beta

Key Functions:

1. Determine optimal sets, reps, and intensity
2. Track fatigue and readiness (future feature) metrics
3. Implement deload protocols when needed
4. Adjust training based on recovery status
5. Balance volume across movement patterns

4. Athlete Adaptation Module

Purpose: Personalize training based on individual response and sport demands

Model: Grok 3 mini beta

Key Functions:

1. Identify responder types and adaptation patterns
2. Align training with competitive calendar
3. Implement sport-specific exercises and protocols
4. Create athlete-specific modification rules
5. Track rate of strength gain to guide programming

5. Evaluation & Metrics Module

Purpose: Track progress and provide actionable insights

Model: Grok 3 mini beta

Key Functions:

1. Establish and track performance metrics
2. Validate program effectiveness
3. Aggregate and analyze athlete data
4. Provide insights to other modules for continuous improvement

5. Process evaluation data and:
    1. Provide guardrails/suggestions to Exercise Programming Module for exercise selection

Cross-Module Guidelines

1. **Data Sharing:** All modules must share relevant data through the central data layer
2. **Confidence Scoring:** Every recommendation must include a confidence score
3. **Explanation Generation:** All decisions must include human-readable rationales
4. **Continuous Learning:** Modules must update based on outcome data
5. **Safety First:** Safety constraints override all other considerations
6. **Coach Override Learning:** Modules must learn from coach overrides or be trained at the agent level
7. **Version Control:** Module improvements must be tracked and reversible
8. **Privacy Compliance:** All data handling must comply with privacy regulations

Nexus/Agent Coordination Framework

Here's a comprehensive breakdown of how your consolidated agent modules will coordinate throughout the entire IronBlueprint process:

Phase 1: Initial Evaluation & Data Collection

Primary Module: Evaluation & Metrics Module

- Collects and processes all initial evaluation data
- Creates baseline athlete profile with movement capabilities
- Identifies restrictions and limitations
- Establishes initial performance metrics

Module Interactions:

1. **Evaluation & Metrics → Nexus**:
    - Sends complete athlete profile
    - Provides prioritized list of limitations/needs
2. **Nexus → All Modules**:
    - Distributes relevant profile components to each module
    - Sets initial constraints based on evaluation findings

Phase 2: Initial Program Creation

Coach-Created Initial Program:

1. **Coach Input → Nexus**:
    - Coach creates initial program
    - Nexus analyzes program structure and preferences
    - Nexus learns coach's programming style
2. **Nexus → All Modules**:
    - Shares coach's programming patterns
    - Establishes baseline programming templates

AI-Created Initial Program:

1. **Nexus** orchestrates program creation by:
    - Requesting exercise recommendations from Exercise Programming Module
    - Obtaining loading parameters from Load & Recovery Module
    - Applying sport-specific modifications from Athlete Adaptation Module
2. **Exercise Programming Module**:
    - Selects appropriate exercises based on evaluation data
    - Considers movement limitations and training goals
    - Builds exercise progression framework
3. **Load & Recovery Module**:
    - Determines initial training volumes and intensities
    - Sets appropriate progression rates based on training age
    - Establishes recovery monitoring parameters
4. **Athlete Adaptation Module**:
    - Applies sport-specific customizations
    - Integrates competitive schedule considerations
    - Adjusts for individual factors (school/work schedule, etc.)
5. **Nexus** compiles and validates the final program ensuring:
    - Program coherence across all training variables
    - Appropriate exercise sequencing
    - Alignment with periodization principles

Phase 3: Ongoing AI Program Creation

Data Collection & Analysis:

1. **Evaluation & Metrics Module**:
    - Continuously collects training data
    - Tracks performance metrics (strength gains, etc.)

    - Monitors adherence and completion rates
2. **Load & Recovery Module**:
    - Processes readiness and fatigue metrics
    - Identifies recovery patterns
    - Flags potential overtraining signals

Program Adaptation Cycle:

1. **Nexus** initiates program updates by:
    - Athlete completing their last day of training for the week by:
        i. Tier 1: Primary Trigger (User-Initiated)
            1. User explicitly taps "Complete Workout" button
        ii. Tier 2: Reminder System (User-Prompted)
            1. User starts workout + completes exercises 75% or more of sets + 2 hours pass without completion
            2. Action: Send push notification: "Looks like you finished your workout. Tap to complete and track your progress!"
        iii. Tier 3: Smart Auto-Completion (System Backup)
            1. Trigger: 75% or more of sets logged as completed + app closed + 3 hours passed
            2. Action: Automatically mark workout as complete with a "system completed" flag
    - Requesting performance analysis from Evaluation & Metrics
    - Determining if progression, maintenance, or regression is appropriate
    - Setting priorities for the upcoming training block
2. **Evaluation & Metrics → All Modules**:
    - Distributes performance data and progress metrics
    - Provides insights on response to previous programming
3. **Exercise Programming Module**:
    - Updates exercise selections based on progress
    - Implements appropriate progressions/regressions
    - Ensures technical development alongside loading increases
4. **Load & Recovery Module**:
    - Adjusts volume and intensity parameters
    - Implements deload protocols when needed
    - Fine-tunes recovery strategies based on observed patterns
5. **Athlete Adaptation Module**:
    - Refines sport-specific elements based on observed adaptations
    - Updates periodization based on competitive calendar
    - Adjusts training based on identified responder type
6. **Nexus** compiles and validates updates:
    - Ensures logical progression from previous program
    - Maintains training balance and program coherence

    - Provides explanation for significant changes

Phase 4: Re-Evaluations & Program Refinement

Re-Evaluation Process:

1. **Evaluation & Metrics Module**:
    - Processes new evaluation data
    - Compares to baseline and tracks improvements
    - Identifies new or resolved limitations
2. **Evaluation & Metrics → Nexus**:
    - Provides progress report
    - Highlights significant changes from previous evaluations
    - Recommends focus areas based on findings

Program Refinement:

1. **Nexus → All Modules**:
    - Distributes updated evaluation data
    - Establishes new priorities based on findings
    - Adjusts constraints as appropriate
2. **All Modules → Nexus**:
    - Submit adjusted recommendations based on new data
    - Provide rationale for significant changes
3. **Nexus**:
    - Integrates new recommendations
    - Updates global athlete model
    - Ensures continuity despite potential programming shifts
    - Generates comprehensive program explanation for coach review

Implementation Considerations

1. **Standardized Data Exchange Format**:
    - Design a consistent data structure for athlete profiles
    - Create standardized APIs between modules
    - Implement versioning for profile updates
2. **Decision Hierarchy**:
    - Establish clear precedence rules for conflicting recommendations
    - Define override protocols for coach inputs
    - Create confidence scoring for recommendations
3. **Communication Protocols**:

    - Implement asynchronous messaging between modules
    - Design event-driven updates for real-time data
    - Create logging system for decision transparency
4. **Feedback Loops**:
    - Build mechanisms for modules to learn from program outcomes
    - Implement continuous improvement cycles
    - Create coach feedback integration pathways