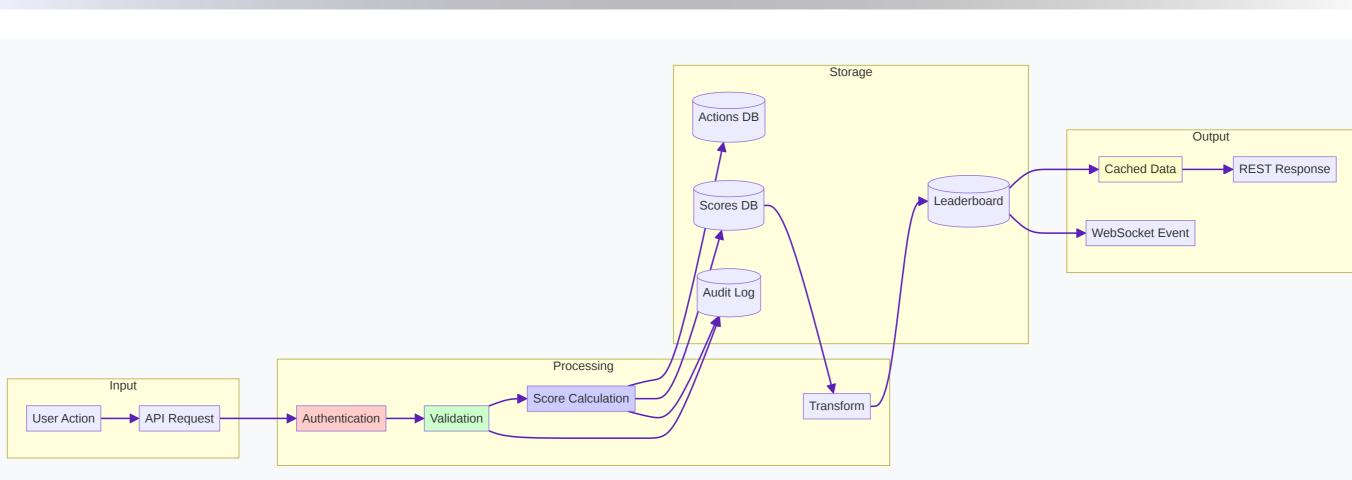
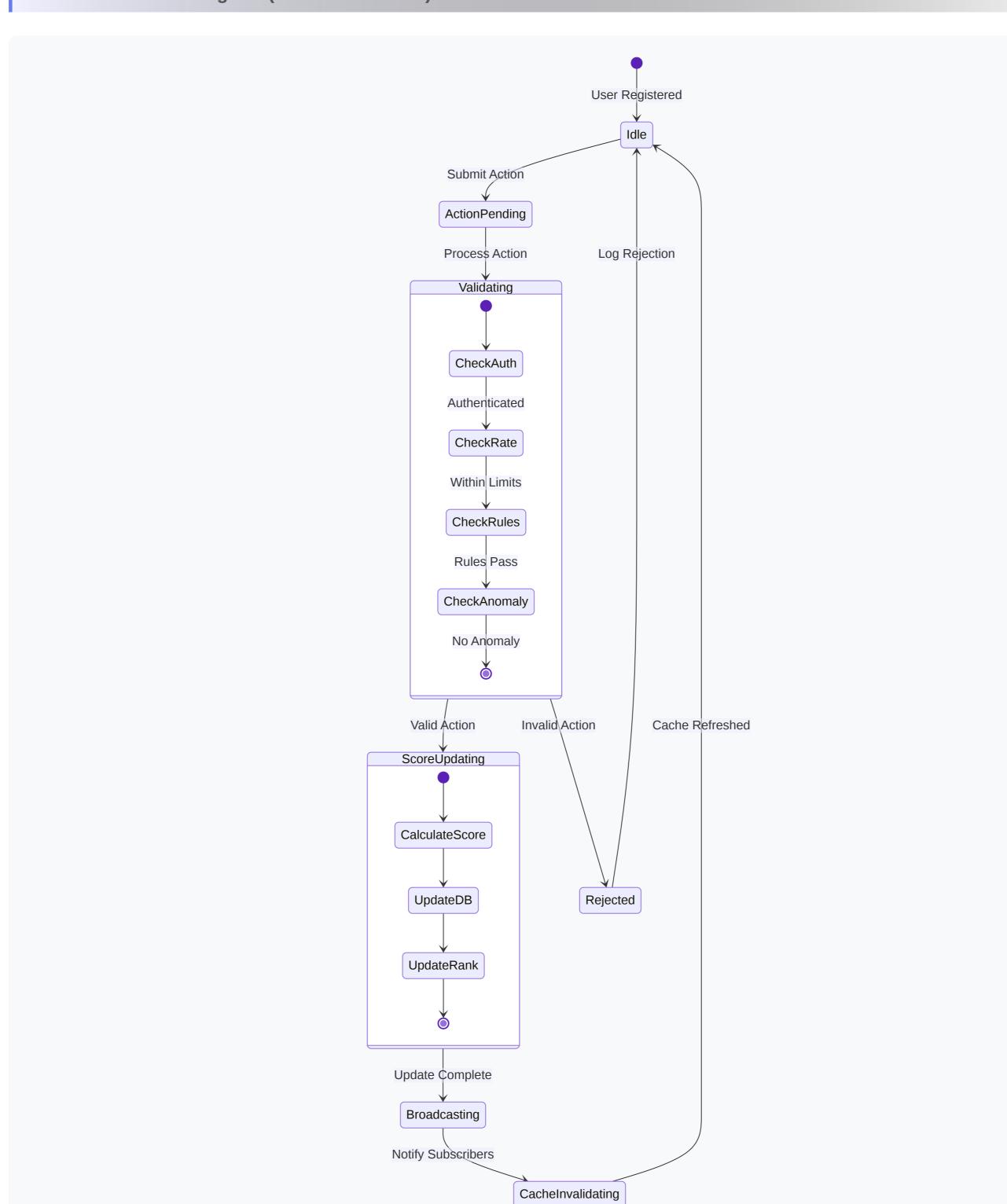


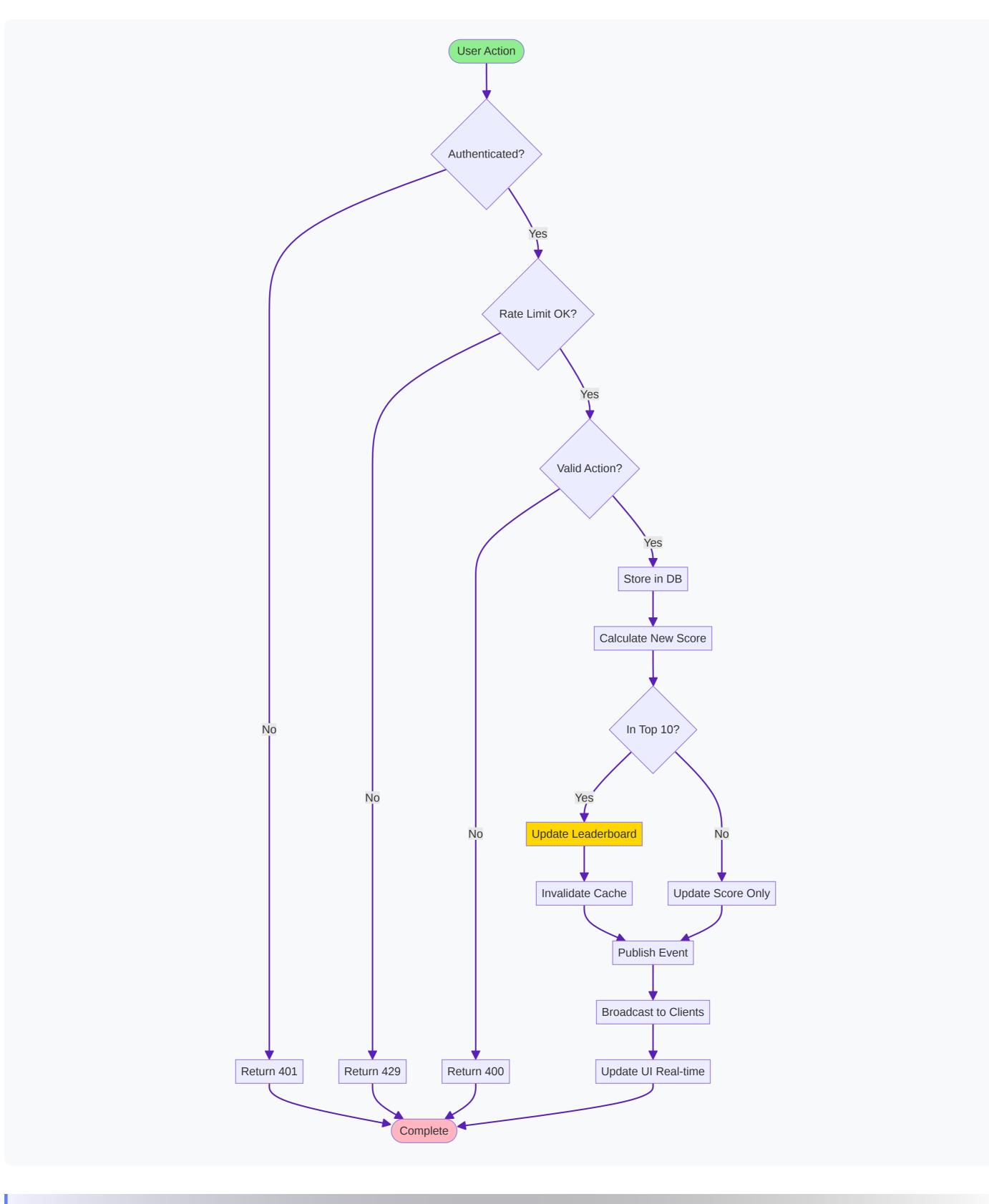
### 3. Data Flow Diagram

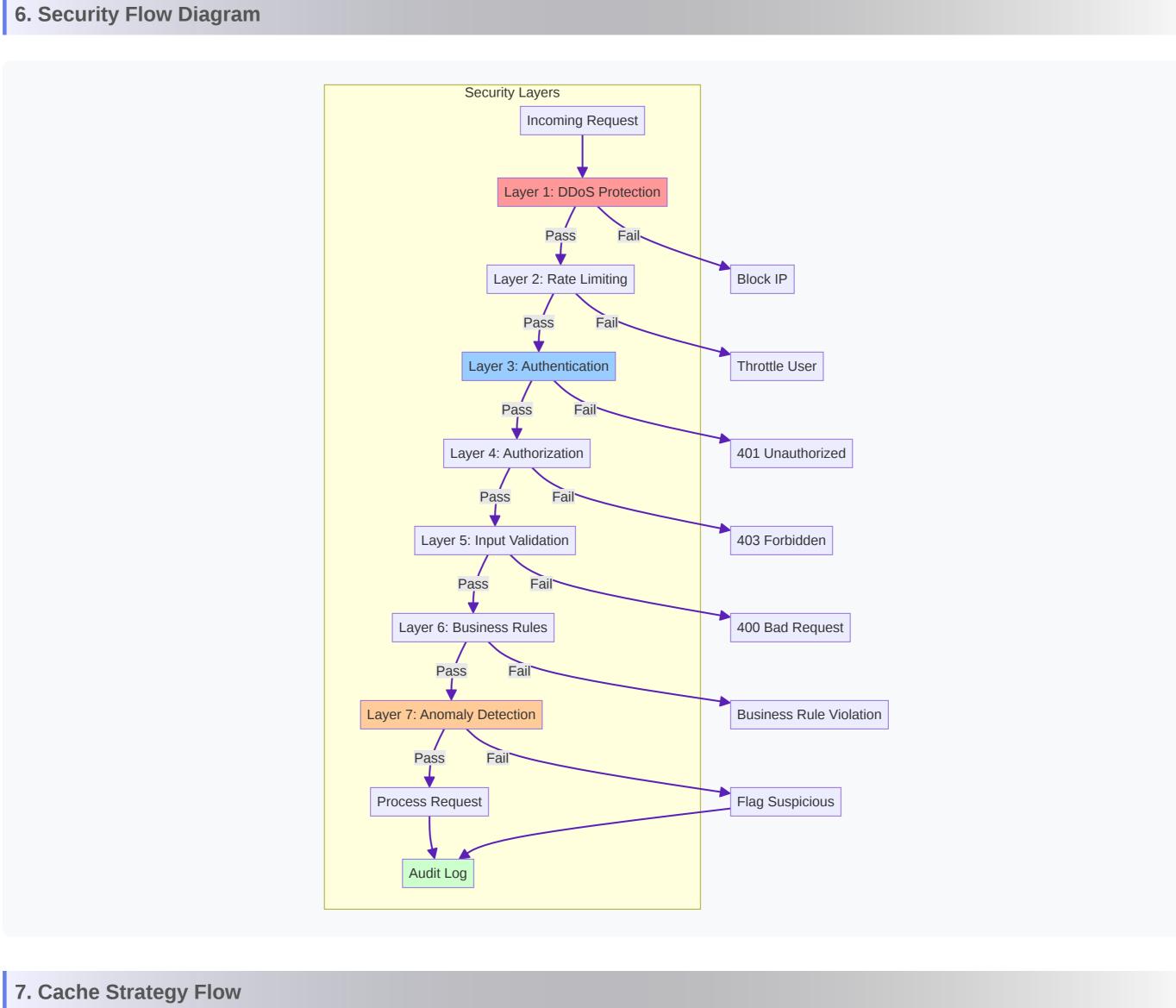


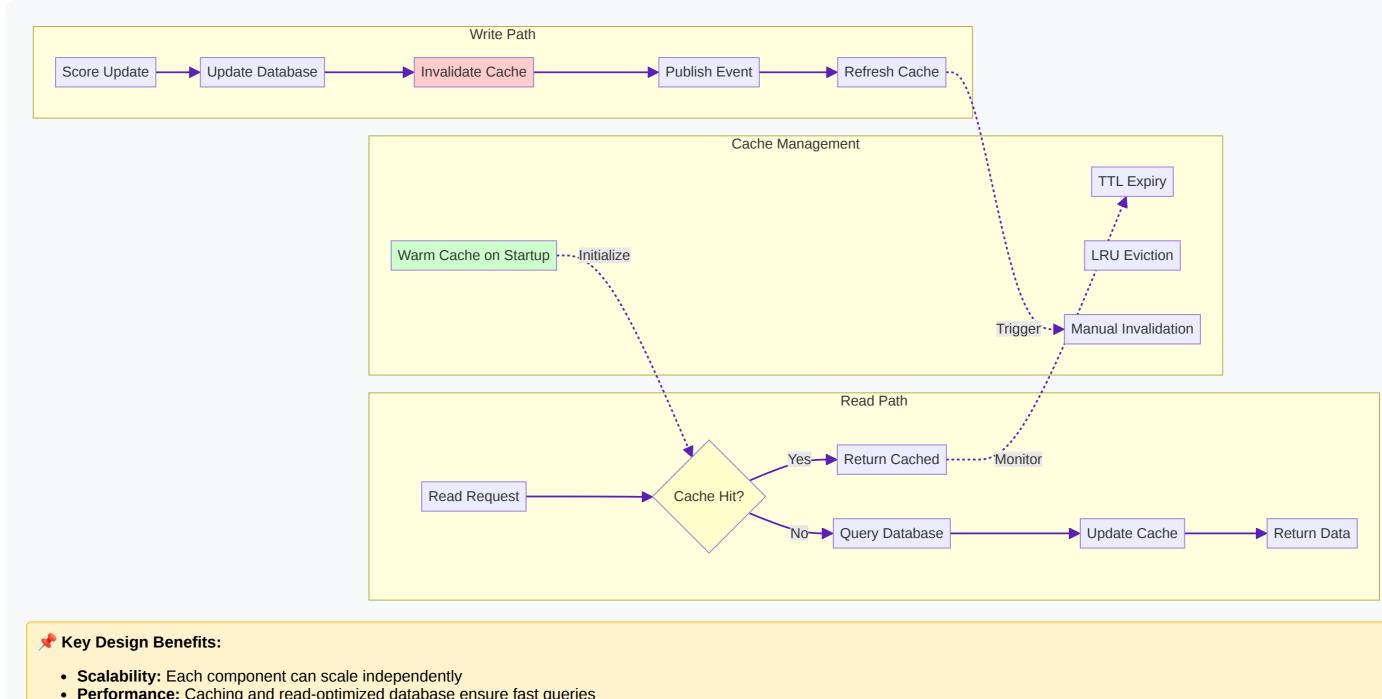
## 4. State Transition Diagram (User Score State)



# 5. Component Interaction Flowchart







Performance: Caching and read-optimized database ensure fast queries
Real-time: WebSocket connections provide instant updates
Security: Multiple validation layers prevent cheating
Reliability: Event-driven architecture ensures eventual consistency
Maintainability: Clear separation of concerns and modular design

Implementation Notes: Database Choice: PostgreSQL for ACID compliance and JSONB support for flexible event storage
 Caching Strategy: Redis with 5-minute TTL for leaderboard, instant invalidation on updates
 Message Queue: RabbitMQ or Kafka for reliable event delivery
 Real-time Protocol: WebSockets with SSE fallback for broader compatibility
 Security: JWT with 15-minute expiry, refresh token rotation, and comprehensive audit logging

