

# KBL TRACKER

## The Complete Guide

*"Every stat tells a story. Every game writes a chapter. KBL Tracker remembers them all."*

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Built with React 19, TypeScript, Vite, and IndexedDB  
36 Calculation Engines | 38 Storage Modules | 5,653 Tests

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# 1. WHAT IS KBL TRACKER?

KBL Tracker (Kruse Baseball League Tracker) is a comprehensive stat-tracking companion application for Super Mega Baseball 4 (SMB4), the beloved video game baseball simulation. Unlike real baseball analytics tools, KBL Tracker is purpose-built for the unique rules, gameplay mechanics, and narrative moments that define SMB4 leagues. It transforms a video game into a franchise management and statistical storytelling experience.

## Philosophy: Baseball Fandom Meets Data Science

The guiding principle is elegantly simple: **if it matters in baseball, it matters here**. But there's a critical twist — **fun always trumps formality**. Traditional baseball analytics are crucial, implemented faithfully (FanGraphs-style WAR, advanced pitching metrics, fielding zone systems). Simultaneously, KBL Tracker celebrates the chaotic, memorable, personality-driven moments that make baseball beloved: the diving catch, the walk-off home run, the pitcher hit by a comebacker, the player who strikes out four times in one game.

## What KBL Tracker Tracks

KBL Tracker maintains a complete statistical and narrative database for every game, season, and career milestone. Stats: batting average, slugging percentage, OPS, WAR (all five variants), ERA, FIP, WHIP, 50+ advanced metrics. Narrative: Fame Bonuses (web gems, walk-offs, perfect games) and Fame Boners (golden sombreros, TOOTBLANs, nut shots). A pitcher can have terrible ERA but gain Fame by throwing a no-hitter. A hitter can post incredible WAR but become infamous for a golden sombrero.

## The Data Foundation

KBL Tracker ships with: 260+ players with real SMB4 ratings (Power, Contact, Speed, Fielding, Arm, Velocity, Junk, Accuracy), 20 pre-configured teams, 63 real SMB4 traits affecting salary and personality. All data stored locally via IndexedDB — no accounts, no cloud, no syncing. Your league data is yours alone, secure and private.

## Technical Foundation

Built in React 19 with TypeScript, compiled by Vite, powered by 36 calculation engines and 38 storage modules. 5,653 passing tests across 134 files verify correctness of everything from substitution logic to WAR calculations. The app runs entirely in your browser — no server, no latency, instant responses. A typical season (128 games, 20 teams, career tracking) consumes ~19MB IndexedDB storage, with support for 50GB+ total.

### Key Design Philosophy

KBL Tracker separates concerns into two systems: **Stats** (what objectively happened) and **Narrative** (what fans remember). A brilliant defensive play is tracked as Play Value statistically and as Fame Bonus narratively.

## Architecture Overview

Two-layer architecture: **Core Logic Layer** (36 engines for calculations, 38 storage modules) separated cleanly from **UI Layer** (React components, hooks, pages). This allows engines to be tested independently and reused across contexts. The storage layer is unified through *trackerDb.ts*, a centralized IndexedDB manager handling all persistence.

Every in-game decision flows through a state machine verified by 480 logic matrix transitions. This ensures impossible states are prevented and dependent calculations cascade correctly.

## 2. GETTING STARTED — THE LEAGUE BUILDER

Every KBL Tracker experience begins in the League Builder, a sophisticated multi-step wizard transforming blank slate decisions into a fully-configured franchise ready for gameplay. The League Builder comprises six core modules: Leagues, Teams, Players, Rosters, Draft, and Rules.

### The Six Modules

#### Leagues

Top-level containers for organizing multiple leagues. Each league has its own teams, season count, and configuration. Leagues are organizational — they allow you to run parallel SMB4 simulations without mixing data.

#### Teams

Reusable across leagues. This key design decision lets you build a team once and deploy it to multiple leagues. A team contains: name, location, abbreviation, primary/secondary colors, stadium name, initial farm system. Teams ship with defaults from real SMB4 teams but are fully customizable.

#### Players

Global player pool. KBL Tracker ships with 260+ players imported with real SMB4 ratings: Power (0-99), Contact (0-99), Speed (0-99), Fielding (0-99), Arm (0-99), Velocity (0-99), Junk (0-99), Accuracy (0-99). Players have assigned traits from 63 real SMB4 traits affecting salary, personality, and gameplay.

#### Rosters

Assign players to teams. 22 active players (9 position, 1 DH, 8 pitchers) plus 10 prospects = 32 per team. Rosters are mutable — modify during offseason (free agency, trades, releases, call-ups) or correct as needed.

#### Draft

Handles expansion draft (new league) or entry draft (populating farm systems). Uses snake format for fairness — team 1 picks first, team 20 picks last, then team 20 picks first in round 2. All drafted players go to farm.

#### Rules

Configures league-wide parameters: designated hitter (yes/no), games per team (default 128), innings per game (default 9), playoff format (conference structure, wild card slots, series lengths), salary cap rules, and more.

### The Franchise Creation Workflow

When starting a new league, KBL Tracker guides you through six steps:

- ◆ **Step 1: League Setup** — Name your league, select team count, configure DH and season length.
- ◆ **Step 2: Team Selection** — Choose 20 teams from the SMB4 roster or create custom teams. Assign colors and stadium names.
- ◆ **Step 3: Player Pool** — Import the full 260+ dataset or select specific players for a smaller pool.
- ◆ **Step 4: Roster Construction** — Assign players to positions. System validates roster legality.
- ◆ **Step 5: Draft/Expansion** — Conduct snake draft to fill farm systems, or skip if reconfiguring.
- ◆ **Step 6: Rules & Confirmation** — Set salary rules, playoff configuration, confirm. System auto-calculates initial salaries.

## Data Persistence & Storage

Each franchise is an isolated save slot in IndexedDB, a browser-local database. Leagues, teams, players, rosters, configuration are persisted immediately. IndexedDB supports 50GB+ — a typical franchise uses 19MB per season, supporting 2,600+ seasons.

## Initial Salary Calculation

When created, KBL Tracker calculates opening-day salaries using a seven-factor formula combining player ratings, position, age, traits, previous performance, fame, and personality. A young power hitter with a valuable trait earns more than an aging contact hitter with neutral traits.

# 3. THE GAMETRACKER

The GameTracker is the heart of KBL Tracker. It's where you record every at-bat as you play SMB4, turning individual plays into comprehensive game records. The GameTracker combines input flexibility, intelligent inference, automatic correction, and simultaneous tracking of batting, pitching, fielding, and special events.

## The 4-Tier Input Hierarchy

GameTracker employs a progressive input system adapting to your needs:

**Tier 1: Auto-Infer** — System detects outcome from game state. Tap the batter, system infers result.

**Tier 2: Prompt** — System prompts with likely outcomes. Confirm with one tap.

**Tier 3: Quick Entry** — Drag fielder to location or batter to base. System infers outcome.

**Tier 4: Manual** — Full control. Specify every detail: batter, pitcher, fielders, outcome.

## All-Encompassing At-Bat Results

GameTracker tracks all baseball results: singles (1B), doubles (2B), triples (3B), home runs (HR), walks (BB), strikeouts (K), groundouts (GO), flyouts (FO), fielder's choices (FC), errors, wild pitches, passed balls, balks, hit-by-pitches (HBP), and sacrifices (SF, SH).

## Baserunner Logic & Force Plays

GameTracker implements complete baserunner logic. A single with runner on first is automatic force at second. Double plays require two runner outs. The system understands the third-out-on-force rule (force play doesn't advance preceding runners). RBI attribution is intelligent: single with bases loaded = 1 run, double with runners on 2nd and 3rd = 2 runs.

## Fielding & Spray Chart System

5-direction zone model (Left, Left-Center, Center, Right-Center, Right) for quick entry, backed by a detailed 25-zone field diagram for precise spray chart data. Fielding play values computed from zone difficulty, position weight, and play type (routine 1.0x, running 1.5x, diving 2.5x, robbed HR 5.0x).

## Substitutions & Pitching Changes

GameTracker tracks all substitution types: pinch hitters, pinch runners, defensive replacements, and pitching changes. Double switches fully supported. Inherited runner tracking ensures proper earned run attribution.

## **Smart Auto-Correction**

GameTracker auto-corrects impossible outcomes. Groundout with two runner outs becomes a double play. Flyout with runner on third scoring becomes a sacrifice fly. These corrections prevent manual entry errors.

## **State Machine & Undo Stack**

Every play flows through a 480-transition state machine preventing impossible states (e.g., marking runner both on base and out). 10-state undo stack allows correction of recent entries. Auto-save to IndexedDB happens after every event.

## **Pitch Count Tracking**

Rather than pitch-by-pitch granularity, GameTracker tracks counts at strategic moments: after strikeouts, walks, and pitcher changes. Provides ERA-relevant context without minute-by-minute logging.

## 4. THE FAME SYSTEM

Fame is KBL Tracker's narrative reputation system tracking what fans *remember*, not what statistically happened. A pitcher with 5.00 ERA throwing a no-hitter gains Fame. A hitter with incredible WAR striking out four times in a game suffers a Fame Boner. Fame is purely subjective and memory-based, intentionally separate from WAR.

### Fame Bonuses & Boners

**Fame Bonuses (+1):** Web Gems, Robberies, Walk-offs, No-Hitters, Perfect Games, Immaculate Innings, Maddux, Cycles.

**Fame Boners (-1):** Nut Shots (defender), Golden Sombrero (4K), TOOTBLANs, mental errors, pitching meltdowns.

### Net Fame & Impact

Net Fame = Bonuses - Boners. A player with +15 Fame Bonuses and -3 Fame Boners has Net Fame +12. Fame influences All-Star voting (6.67% weight), MVP/awards voting (5%), fan morale, and beat reporter coverage. Importantly: Fame does **not** affect WAR. The separation is intentional.

## 5. SPECIAL EVENTS

**Nut Shot:** Ball hits fielder in groin. Batter +1 Fame Bonus. Fielder -1 Fame Boner UNLESS they make the play (Tough Guy +1). Career tracking. Affects pitcher Mojo.

**TOOTBLAN:** Thrown Out On The Basepath Like A Nincompoop. Picked off, caught in rundown. -1 Fame Boner.

**Web Gem:** Spectacular defensive play. +1 Fame Bonus.

**Robbery:** Catching would-be HR at wall. +1 Fame Bonus.

**Killed Pitcher:** Comebacker that hits pitcher hard. +1 Fame Bonus for batter.

**Walk-off:** Game-winning hit in final inning. +1 Fame Bonus.

**Immaculate Inning:** 3 strikeouts on exactly 9 pitches. +2 Fame Bonus.

**No-Hitter / Perfect Game:** No-Hitter +3, Perfect Game +3 Fame Bonus.

**Maddux:** Complete game shutout on <67 pitches (scaled to season length). +2 Fame Bonus.

**Golden Sombrero:** 4 strikeouts in one game. -1 Fame Boner.

**Cycle:** Single, Double, Triple, HR in one game. +2 Fame Bonus.

### Detection Philosophy

GameTracker auto-detects events where possible, prompts when suspected, allows manual entry for edge cases. The system learns from context.

# 6. WAR & ADVANCED ANALYTICS

KBL Tracker implements full FanGraphs-style WAR methodology adapted for SMB4. WAR (Wins Above Replacement) quantifies player value in wins. A 5.0 WAR player adds 5 wins vs replacement.

## The Five WAR Components

**bWAR (Batting):** Offensive value from hits, walks, power.

**pWAR (Pitching):** Pitching value from strikeouts, walks, HRs allowed (FIP-based).

**fWAR (Fielding):** Defensive value from zone-based play analysis.

**rWAR (Baserunning):** Value from SBs, extra-base taking, DP avoidance.

**mWAR (Manager):** Manager WAR! Weighs in-game decisions by leverage.

## Adaptive Standards Engine

Critical innovation: KBL Tracker recalibrates all WAR baselines for your specific franchise. If your league plays 48-game seasons (vs MLB's 162), each run is worth more. Opportunity Factor = (Games × Innings) / (162 × 9). Counting stats scale; rate stats don't.

## bWAR Calculation Chain

Raw stats → Linear Weights → wOBA → wRAA → Park-adjusted Batting Runs → Replacement Level → ÷ Runs Per Win (scaled) = bWAR.

## pWAR (Pitching WAR)

Based on FIP:  $FIP = ((13 \times HR) + (3 \times (BB + HBP)) - (2 \times K)) / IP + 3.28$ . Starter vs reliever replacement levels differ. Relievers get leverage adjustment.

## fWAR (Fielding WAR)

Zone-based play values. Play Value = Base Run Value × Difficulty × Position Weight. Multipliers: routine 1.0x, running 1.5x, diving 2.5x, robbed HR 5.0x. Position modifiers: C 1.3x, SS 1.2x, 1B 0.7x.

## rWAR (Baserunning WAR)

BsR = wSB + UBR + wGDP. Stolen bases, extra base taking, DP avoidance. CS costs more than SB gains.

## **mWAR (Manager WAR)**

Unprecedented in analytics — mWAR quantifies managerial impact. decisionWAR (60%) weights every in-game decision by leverage. overperformanceWAR (40%) attributes team over/underperformance (manager gets 30%). Scale: >4.0 elite, <-1.0 poor.

## **Leverage Index**

LI (Leverage Index) quantifies game criticality.  $LI = baseOutLI \times inningMultiplier \times scoreDampener$ . Bases loaded, 2 out, 9th inning tied = LI ~6.94. Blowout 3rd inning = LI ~0.60.

## **Grade Algorithm (S to C-)**

Overall grade from weighted ratings. Position players: 3:3:2:1:1 (Power:Contact:Speed:Fielding:Arm). Pitchers: 1:1:1 (Velocity:Junk:Accuracy). Two-way: both  $\times 1.25$ .

# 7. MOJO & FITNESS

Mojo and Fitness represent in-game and between-game player states. Mojo is dynamic confidence. Fitness is physical condition.

## Mojo: 5-Level Confidence

**Jacked (+2):** Maximum confidence. All bonuses active.

**Locked In (+1):** High confidence. Moderate bonuses.

**Normal (0):** Baseline state.

**Tense (-1):** Lower confidence. Penalties to contact/power.

**Rattled (-2):** Severe loss of confidence. Hard to escape.

Positive triggers: hits, HRs, RBIs, SBs, pitcher Ks, great defense. Negative triggers: Ks, errors, CS, runs given up, wild pitches. Amplified in high-pressure (tie game late = 1.5x).

## Fitness: 6 Persistent States

**Peak:** Optimal. Max performance.

**Healthy:** Normal condition.

**Fatigued:** Slight decline. Reduced bonuses.

**Worn Down:** Significant decline. Performance penalties.

**Injured:** Out of games. Roster replaced.

**Juiced:** PED enhancement. +15% ratings but increased scrutiny.

Fitness persists across games. Peak takes 5 games to achieve; Injured requires 10 games recovery. Juiced triggers increased injury risk and reputation penalties.

# 8. THE SEASON FLOW

A season progresses through phases: Setup, Pre-Season, Regular Season, All-Star Break (60%), Post-Deadline (65%), Playoffs, Offseason.

## Game Options

**Play** — Record every play. Full control, full data.

**SIM 1 Game** — Animated play-by-play. System plays.

**SKIP 1 Game** — Fast-forward. Off-screen with minimal logging.

**Batch SIM/SKIP** — Multiple games at once.

## Simulation Engine

syntheticGameFactory uses real player ratings for realistic games. Better teams win more. Handles pitcher rotation, closer usage, saves/holds, fame events.

## Post-Game Pipeline

4-phase pipeline runs automatically: (1) Immediate updates (records, stats, WAR), (2) Post-game checks (rivalries, nicknames, legacy, chemistry), (3) Narrative generation (headlines, Player of Game), (4) Special game checks (All-Star, deadline, milestones).

## Schedule Configuration

Fully configurable: games per team (default 128), real team/stadium names. 9 innings default. Generated at season start.

# 9. PLAYOFFS & POSTSEASON

Playoffs culminate the season. Three game modes: Franchise playoffs (regular season standings), Exhibition (standalone), Playoff Series (standalone best-of).

## Playoff Structure

Conference-aware seeding, interactive seeding wizard. 4-column bracket: Wild Card → Division Series → Championship → World Series. Series best-of-3, 5, or 7.

## Playoff Features

Clutch multipliers increase. Fame amplified (walk-off +2). Morale swings larger. Championship celebration: confetti, MVP card-reveal with bronze/silver/gold medals.

## Series Details

Game-by-game results, WLP pitchers, statistical leaders. World Series winner gets permanent designation.

# 10. THE OFFSEASON (11 PHASES)

Offseason is a 'game night' — dice rolls, wheel spins, card reveals, ceremonies. Eleven phases transform season data into new opportunities.

**1. Season End:** Final standings, championship processing.

**2. Awards:** 13 categories: Gold Gloves (9), Platinum Glove, Booger Glove, Silver Sluggers (9), Reliever of Year, Bench Player, Rookie, Cy Young, MVP, Manager of Year, Kara Kawaguchi Award. Card-reveal animations.

**3. Ratings:** WAR-based adjustments. Manager distributes bonus points.

**4. Contraction:** At-risk teams dice rolls. Low morale face contraction. Protection. Expansion draft.

**5. Retirements:** Age-based probability. Dice roll reveal. Jersey retirement ceremony.

**6. Free Agency:** Protection, reorderable assignments, animated reveal.

**7. Draft:** Farm-first (all to minors). Snake format. Release if full.

**8. Farm:** Prospect development updates.

**9. Chemistry:** Team chemistry adjustments.

**10. Trades:** Full interface. Salary matching 10%. Reporter warnings. AI counter-offers.

**11. New Season:** Age players, recalc salaries, reset mojo, clear season stats, update rosters, generate schedule.

## Roster Size

22 MLB (9 position, 1 DH, 1 SP, 4 RP) + 10 Farm = 32 per team.

# 11. SALARY & ECONOMICS

KBL Tracker implements a realistic seven-factor formula. Soft cap (not hard) — exceeding generates fan pressure and penalties.

## Seven-Factor Formula

**Base Rating:** Position-weighted (Power 3, Contact 3, Speed 2, Fielding 1, Arm 1).

**Position:** Premium: C/SS > corner OF.

**Age:** 27-31 prime. 36+ discount.

**Traits:** 63 SMB4 traits, tier-adjusted.

**Performance:** Previous WAR/stats adjust.

**Fame:** Bonuses premium, Boners reduce.

**Personality:** Leader boost, trouble-maker penalty.

Min \$500K. Annual recalc. No hard cap. Fan Favorite: highest positive Value Delta. Albatross: most negative.

# 12. NARRATIVE SYSTEM & BEAT REPORTERS

Each team has a named beat reporter with personality, tenure, reputation (Rookie to Legendary). 80/20 personality alignment.

## Content Channels

◆ League News

◆ Team Feed

◆ Pre-Game

◆ Post-Game

◆ In-Game

◆ Offseason

Emergent stories from data (not scripted). Callbacks to past events. Reporter influence on morale — negative accelerates frustration.

## Dynamic Designations

Team MVP, Ace, Fan Favorite, Albatross, Cornerstone (carries over).

## 13. FAN MORALE

0-99 scale with 7 states. Always moving — rarely static >few games.

**Euphoric (90-99):** Fans love. High attendance, merch.

**Excited (75-89):** Engaged, optimistic.

**Content (55-74):** Baseline satisfied.

**Restless (40-54):** Growing discontent. Dips attendance.

**Frustrated (25-39):** Angry. Media mockery.

**Apathetic (10-24):** Stopped caring. Empty.

**Hostile (0-9):** Contraction risk. Active hostility.

Expected Wins baseline: actual vs projected. Recalculates after trades, injuries, All-Star, deadline. Low = contraction risk. High = bandwagon.

## 14. MILESTONES & RECORDS

Three scopes: single-game, season, career. Adaptive scaling: baselines  $\times$  Opportunity Factor. Counting stats scale by season length. Rare events fixed.

### Milestone Watch

Watch panel in pre-game. Career stats survive transitions. Positive (Bonus) and negative (Boner) milestones tracked.

## **15. THE MUSEUM**

All-time leaderboards from career data. Hall of Fame: retirement evaluation based on WAR, peaks, milestones, awards, Fame. Retired numbers permanent. Cornerstone designation carries over.

## 16. STADIUM ANALYTICS & PARK FACTORS

Seed from physical dimensions. Dynamic updates from game data. Handedness splits (LHB vs RHB). Spray chart: 6 zones. Historical by season for trends. Feeds WAR.

# 17. THE FARM SYSTEM

10-player rosters, grades B to C-. Distribution: B(10%), B-(20%), C+(35%), C(25%), C-(10%). Prospect morale: waiting penalty, passed over penalty, mentorship bonus, call-up proximity bonus.

## Prospect Stories

Blocked by veteran, mentorship, rivalry, hometown hero, org favorite. 3 years team control post call-up. Salary based on rating.

# 18. UNDER THE HOOD — TECHNICAL ARCHITECTURE

## Architecture

Two-layer: Core Logic (engines, utils) and UI Layer (React, Figma). Storage: trackerDb.ts unified IndexedDB. Modules: gameStorage, seasonStorage, careerStorage, playoffStorage, offseasonStorage, leagueBuilderStorage.

## Pipeline

36 engines. processCompletedGame.ts orchestrator (4-phase). 38 modules. Data integrity: 21/21 issues (WPA, substitution, walk-off, idempotency).

## Testing

5,653 tests, 134 files. 480 logic transitions verified. React 19 + TypeScript + Vite. Build passes, 0 console errors.

## Performance

IndexedDB async but optimized. Game recording <100ms. WAR batch calculations ~500ms full season.

# 19. QUICK REFERENCE

## Baseball Abbreviations

AB (At Bat) | PA (Plate App.) | AVG | OBP | SLG | OPS | wOBA | wRAA | WAR | ERA | FIP | WHIP | BB | K | HR | RBI | SB | CS | DP | GO | FO | FC | SF | SH | HBP | WP | PB | IP

## KBL-Specific Terms

**Fame Bonus:** +1 memorable

**Fame Boner:** -1 embarrassing

**Nut Shot:** Fielder groin hit

**TOOTBLAN:** Basepath out

**Mojo:** Confidence (Jacked to Rattled)

**Maddux:** CG shutout <67 pitches

**Tough Guy:** Makes catch despite nut shot

**Booger Glove:** Worst fielder

**Kara Kawaguchi:** Best personality

## Grades (S to C-)

S (95-99) | A+ (90-94) | A (85-89) | A- (80-84) | B+ (75-79) | B (70-74) | B- (65-69) | C+ (60-64) | C (55-59) | C- (50-54)

## States

**Mojo:** Jacked | Locked In | Normal | Tense | Rattled

**Fitness:** Peak | Healthy | Fatigued | Worn Down | Injured | Juiced

**Morale:** Euphoric | Excited | Content | Restless | Frustrated | Apathetic | Hostile

*"Every stat tells a story. Every game writes a chapter. KBL Tracker remembers them all."*

## COLOPHON

**Created by:** JK Kruse

**Tech:** React 19, TypeScript, Vite, IndexedDB  
36 Engines | 38 Storage Modules | 5,653 Tests

**Philosophy:** Stats meet Narrative.

**Edition:** February 2026

**For:** Super Mega Baseball 4 Players & Fans