

# E=mc<sup>2</sup> Lending Core - Complete Plain English Guide

## Everything from the Conversation

### Table of Contents

1. [What This System Is](#)
  2. [The Core Philosophy](#)
  3. [The Lender Universe](#)
  4. [The Cards System](#)
  5. [Geographic Coverage](#)
  6. [The Scenario Journey](#)
  7. [Conditional Logic Engine](#)
  8. [Soft vs Hard Boundaries](#)
  9. [Exception Handling](#)
  10. [Import & Field Mapping](#)
  11. [AI-Native Design](#)
  12. [Future-Proofing](#)
  13. [Data Protection](#)
  14. [Reporting & Export](#)
  15. [What Makes This Special](#)
- 

### What This System Is

This is NOT a CRM. This is NOT a loan origination system. This is NOT for marketing or post-closing.

This system manages the critical window between:

- **Start:** A broker receives a loan scenario from a borrower
- **End:** The borrower selects a lender's offer

It's the brain that knows every lender's appetite, matches scenarios intelligently, tracks communications, collects offers, and presents options professionally.

### The Core Philosophy

#### 1. Lenders Are Living Organisms

Traditional systems treat lenders as static records. Wrong. Lenders:

- Change their appetite daily based on portfolio needs
- Have hierarchies (company → region → division → product → program)
- Behave differently based on relationships
- Operate in multiple dimensions (geography, property type, borrower profile, loan size)





## 2. Everything Is Versioned

When a lender changes their max LTV from 75% to 70%, we don't overwrite. We create version 2. This means:

- Historical deals stay accurate forever
- You can time-travel to see what rules were in effect on any date
- Compliance and auditors love you

## 3. Scenarios Can Be Incomplete

Real commercial lending is messy. A broker might know:

-  Loan amount: \$2M
-  Property type: Multifamily
-  Exact FICO (borrower checking)
-  Final NOI (still calculating)

The system uses weighted scoring, not binary yes/no. More complete = higher confidence, but partial matches still work.

## 4. Edge Cases Are Normal

Boat loans? Golf course financing? Factoring? Cannabis properties? The system handles them all through dynamic attributes—no schema surgery needed.

## The Lender Universe

### The Hierarchy

Lender (ABC Capital)

└─ Program (Bridge Loan Program v3)

│ └─ Criteria (Max LTV: 75%, Min FICO: 680)

│ └─ Coverage (States: TX, FL; Metros: DFW only)

│ └─ Pricing (SOFR + 275bps for 60-65% LTV)

└─ Exceptions (Can go to 80% LTV with committee approval)

## Key Concepts

**Lender:** The institution. Has basic info, contacts, and a "profile score" showing data quality.

**Program:** A specific lending product. Version-tracked because terms change over time. A lender might have:

- Bridge Program v1 (old terms)
- Bridge Program v2 (current)
- DSCR Program v1
- Construction Program v1

**Criteria:** The actual underwriting rules. Each has:

- Soft boundaries (marketing limits): "We prefer 70% LTV"
- Hard boundaries (absolute limits): "We absolutely won't exceed 75% LTV"

This prevents dropping good lenders for being 1 point over a soft limit.

## The Cards System

Cards are NOT criteria. Cards are templates that group related criteria and questions.

### Example Cards:

- **Bridge Loan Card:** Groups all bridge-specific criteria and questions
- **Texas State Card:** Texas-specific requirements and questions
- **Foreign National Card:** Special borrower documentation needs

### How Cards Work:

1. Each card contains criteria (the actual rules)
2. Criteria automatically generate questions for scenarios
3. Cards can be versioned independently

4. New products = new cards, not database changes

## The Magic:

If a broker selects "Bridge Loan" + "Texas" + "Purchase", the system:

1. Loads base questions from each card
2. Fires conditional rules that might add Texas-specific bridge questions
3. De-duplicates any overlap
4. Presents one smart, dynamic form

## Geographic Coverage

### The Problem Solved

Some lenders are national. Some are state-only. Some only lend in specific metros like DFW or the Bay Area.

### The Solution

Four levels of coverage:

1. **Lender-wide defaults:** "We lend in these states"
2. **Program overrides:** "But our Bridge program is only TX and FL"
3. **Metro restrictions:** "And in TX, only in DFW"
4. **The EffectiveCoverage view:** Resolves all precedence automatically

A broker searching for "Bridge in Dallas" gets exactly the right lenders without complex queries.

## The Scenario Journey

### Status Flow

Draft → Matching → Shopped → Offers In → Presented → Won/Lost/Abandoned

### Key Features:

**Multiple Rounds:** A broker can shop Round 1, get feedback, adjust, and shop Round 2 without starting over.

**Communication Tracking:** Every email out and in is logged with full content snapshots.

**Offer Management:**

- Indicative → Soft → Firm quotes
- Each tied to exact program version
- Fees and terms in flexible JSON

**Scenario Snapshots:** Freezes the exact version of every card, rule, and program used. Critical for compliance.

## Conditional Logic Engine

### The Power

The system can handle complex rules like:

```
IF [Product = Bridge]
AND [State = Texas]
AND [Loan Amount > $2M]
THEN Ask "Have you confirmed Texas usury law compliance?"
```

### How It Works:

1. **Base Layer:** Default questions from selected cards
2. **Conditional Layer:** Extra questions fired by multi-variable rules
3. **Priority System:** Higher priority rules override conflicts
4. **Live Branching:** "If answer = Yes, show these questions"

### User Control:

Brokers can drag-and-drop to create new rules without coding. The AI can also suggest or create rules based on patterns.

## Soft vs Hard Boundaries

### The Problem

A lender publishes "Max LTV 70%" but will actually go to 75% if pushed. Dropping them at 71% loses good options.

### The Solution

Every numeric criterion has four values:

- **Soft Min:** Preferred minimum (shows in marketing)
- **Hard Min:** Absolute floor (real limit)

- **Soft Max:** Preferred maximum (shows in marketing)
- **Hard Max:** Absolute ceiling (real limit)

## Matching Logic:

- **Within soft bounds:** Full score
- **Between soft and hard:** Reduced score + possible exception
- **Outside hard bounds:** Excluded (unless exception granted)

## Exception Handling

### Definition Level

Programs define what exceptions are allowed:

- "LTV can exceed by up to 5% with credit committee"
- "FICO can go 20 points below with additional collateral"
- "Loan amount can increase 10% with partner approval"

### Grant Level

When a specific deal needs an exception:

1. Broker requests exception through the system
2. Creates audit trail with justification
3. Lender approves/denies with notes
4. Approved value stored (e.g., "Approved at 78% LTV")
5. Full history maintained for compliance

## Import & Field Mapping

### The Reality

Brokers have lender data in Excel, CSV, or even PDFs. It's messy, inconsistent, and uses different column names.

### The Process

1. **Upload:** Broker uploads their file
2. **AI Pre-Mapping:** System suggests "Their 'Max Loan' = Our 'max\_loan\_amount'"
3. **Manual Adjustment:** Broker tweaks any incorrect mappings

4. **Validation:** System flags issues (duplicates, missing required fields)
5. **Commit:** Data slots into proper tables with version tracking
6. **Original Preserved:** Raw import kept for audit trail

### Smart Features:

- Fuzzy matching detects "Stone Creek Capital" = "Stone Creek Cap"
- New products auto-create cards
- Updates create new versions, not overwrites
- Unmapped fields stored as dynamic attributes

## AI-Native Design

### Core Principle

Every piece of data knows whether it was created/modified by a human or AI, with full explainability.

### What AI Can Do:

1. **Read Everything:** All tables have descriptions, clear naming, and relationships
2. **Make Smart Changes:** Update criteria, create rules, tune scoring
3. **Explain Actions:** "I lowered Park Place's profile score because 3 recent rejections cited outdated rates"
4. **Learn Patterns:** "Scenarios missing DSCR have 73% rejection rate with these lenders"
5. **Suggest Improvements:** "Add question about ground lease for retail properties over \$5M"

### User Control:

Each user has AI permission levels:

- **Read-Only:** AI can analyze but not change
- **Suggest:** AI proposes changes for human approval
- **Autonomous:** AI makes changes with full audit trail

### The Safety Net:

- Every AI action logged with before/after states
- Justification required and stored
- Changes follow same versioning rules
- Triggers prevent destructive actions

# System Configuration & Events

## System Configuration

A master control panel for the entire system. Instead of hardcoding values or scattered settings, everything lives in one table:

### Examples:

- `matching_algorithm_version`: "2.0"
- `soft_boundary_penalty_points`: 15
- `max_scenario_age_days`: 180
- `require_exception_approval`: true

### Why This Matters:

- Change behavior without code deployments
- A/B test different algorithms
- Schedule changes with effective dates
- Different settings per tenant or user
- Full audit trail of what changed when

## System Events

The heartbeat of the entire system. Every significant action creates an event:

### Event Examples:

```
SCENARIO_CREATED -> {scenario_id, user_id, initial_status}
LENDER_SELECTED -> {scenario_id, lender_ids, round_number}
OFFER_RECEIVED -> {offer_id, lender_id, rate, amount}
PROGRAM_UPDATED -> {old_version, new_version, what_changed}
AI_RULE_CREATED -> {rule_id, conditions, justification}
```

### The Power:

1. **Time Travel:** Replay events to see system state at any moment
2. **Debugging:** "What happened to cause this issue?"
3. **Analytics:** Stream to data warehouse without touching production
4. **Integrations:** External systems subscribe to relevant events



5. **Audit Trail:** Complete forensic record for compliance
6. **Undo/Redo:** Reverse actions by replaying alternate events

**Real Example:** A broker asks: "Why did this lender show up in my search last week but not today?" Query SystemEvents:

- Find PROGRAM\_UPDATED events for that lender
- See they tightened geography from "All TX" to "DFW only"
- Show exactly when and who made the change

This table becomes the source of truth for everything that happens in the system.

## **Future-Proofing**

### **30-Year Vision Built In:**

#### **1. Tokenized Collateral**

- Tables ready for fractional ownership
- Blockchain addresses supported
- "0.25 of a tokenized Miami office building"

#### **2. Streaming Real-Time Data**

- FactLedger accepts IoT feeds
- Rent rolls updating hourly
- Bank balances via API
- ESG sensors for green compliance

#### **3. Global Regulatory Compliance**

- Regulation tables for any jurisdiction
- Rules in human and machine-readable format
- Automatic compliance checking

#### **4. Self-Describing Fields**

- New products bring new fields
- AttributeDefinition registry validates
- No schema changes needed

## 5. Multi-Currency from Day 1

- Every money field has currency code
- FX rate tracking included
- Ready for international lending

## Data Protection

### Hard Delete Prevention

Database triggers physically prevent deleting records. You must:

- Set Active = FALSE for soft delete
- Create new versions for updates
- Keep full history for audit

### Privacy by Design

- DataSensitivity table flags PII
- Export functions auto-mask sensitive data
- Audit trail on all access
- Row-level security ready

### Consistency Checking

- Nightly jobs scan for contradictions
- Duplicate criteria auto-flagged
- Orphaned records detected
- Issues logged for review

## Reporting & Export

### Master Lists

Pull comprehensive lender lists with one query:

- All lenders with all programs
- Filtered by product: "All bridge lenders"
- Filtered by geography: "All Texas DSCR lenders"
- Filtered by criteria: "All lenders doing 80%+ LTV"

## Saved Views

Brokers save frequent filters:

- "My PA Bridge Lenders"
- "Cannabis-Friendly Lenders"
- "Quick-Close Programs"

## Export Formats

- **Excel:** Clean, readable, one row per program
- **PDF:** Branded templates for client presentations
- **API:** JSON for integrations

## The "Briefcase Test"

Can a broker print a list for a flight? Yes. The vw\_program\_printable view flattens everything into human-readable columns. No UUIDs, no JSON, just clean data.

## What Makes This Special

### 1. It's Honest About Reality

- Lenders change daily
- Data is always incomplete
- Edge cases are normal
- Relationships matter

### 2. It's Built for Evolution

- New products plug in
- AI can extend it
- Regulations bolt on
- No rewrites needed

### 3. It Preserves Truth

- Every version saved
- Every change logged
- Every exception tracked
- Every communication stored

## **4. It's Actually Intelligent**

- Soft vs hard boundaries
- Weighted scoring
- Dynamic questions
- Learn from patterns

## **5. It Scales Correctly**

- 10,000 scenarios = trivial
- 10 million = comfortable
- Read replicas for reports
- Indexes on hot paths

## **The Secret Sauce Queries**

### **"Who's Hot Right Now?"**

Finds lenders with recent wins, fast responses, and growing appetite.

### **"Hidden Gems"**

Discovers quality lenders with great data who haven't been tried recently.

### **"Confidence Boost"**

Shows which missing fields would most improve match quality.

### **"Exception Patterns"**

Reveals which lenders are flexible on which criteria.

## **Implementation Philosophy**

### **Start Simple**

1. Load lenders and programs
2. Add basic criteria
3. Test matching logic
4. Add cards and rules
5. Enable AI features
6. Turn on automation

## But Build for Forever

- Every table ready for 2055
- Every relationship properly keyed
- Every field properly typed
- Every action properly logged

## The Competitive Edge

With this schema:

- Match accuracy beats any competitor
- Updates happen in real-time
- Compliance is automatic
- Scaling is trivial
- AI amplifies everything

This isn't just better than existing systems—it's what should have existed from the beginning.

## Final Truth

This schema is  $E=mc^2$ :

- **E** (Energy): The dynamic, living nature of lender data
- **m** (Mass): The complete weight of all lending dimensions
- **c<sup>2</sup>** (Speed of Light Squared): The exponential power of relationships and intelligence

Simple formula. Infinite power. The only lender database you'll ever need.