RetireChain - Proof of Concept Validation Summary (October 2025)

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1. Objective

The RetireChain proof of concept demonstrates that retirement-related contribution and deferral events can be validated, hashed, and immutably timestamped on the Solana blockchain within seconds, without exposing any personally identifiable information (PII). The goal of this phase was to confirm sub-30-second confirmation times, low transaction costs, and consistent reliability using an automated validation and proof script.

2. Summary of Testing

- Event Types: deferral_change and contribution_posted
- Total Runs: 50 valid events
- Validation Checks: event_type enum, positive amount, ISO UTC timestamp
- Hashing: SHA-256(salt + canonical JSON) with sorted keys and normalized floats
- Memo Format: v1|event_type|base58(hash)|unix_ts
- Environment: Solana Devnet cluster with <= 0.2 SOL funded wallet

3. Results

Metric	Target	Actual	Status
Success Rate	>= 99%	100% (valid events)	PASS
Avg Confirmation Time	< 30 s	5.2 s	PASS
Avg Fee per Tx	< 0.005 SOL	0.000005 SOL	PASS
Hash Verification	Match computed hash values	All confirmed on-chain	PASS

4. Artifacts Verified

- Code Repository: Verified private repository hosted on GitHub (includes index.js, reports, and logs).
- Reports: JSON and CSV files documenting transaction signatures, confirmation times, and fees.
- Verification: All valid transactions confirmed on Solana Devnet via public explorers.

5. Performance and Reliability Notes

The 50-run batch executed sequentially with built-in retry logic (0.5 -> 1 -> 2 -> 3 seconds) to stabilize RPC performance. All transactions confirmed on the first attempt, maintaining 100% success. Average confirmation time remained under 6 seconds, and total runtime was approximately four minutes. Performance remained consistent across multiple batches and no PII was exposed.

6. Future Development Path

This proof lays the groundwork for expanding RetireChain into a scalable infrastructure for secure financial recordkeeping. Planned enhancements include AI-assisted validation modules to automate cross-checking of payroll and contribution data for accuracy, compliance, and anomaly detection without revealing sensitive information. Next steps include producing a demonstration video, building a visual dashboard MVP, and submitting the project for Solana Foundation grant review.