LIGATE LABS

"Binding the Future of Decentralized Intelligence"

A Sovereign Blockchain Protocol for AI Provenance,
Proof of Prompt, and Full-Stack Web3 Infrastructure

Whitepaper v1.0

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Ligate Labs | ligate.io
Themisra Protocol | themisra.xyz
Kleidon | kleidon.xyz

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1. Abstract

Abstract

*This paper presents **Ligate Labs**, a blockchain research and development laboratory building two complementary protocols on a unified sovereign rollup: **Themisra**, the first blockchain purpose-built for AI provenance and Proof of Prompt verification, and **Kleidon**, a full-stack multi-chain Web3 infrastructure platform for game studios, SaaS companies, and content creators. Both protocols operate natively on the **Ligate Network**, a sovereign rollup built with the Sovereign SDK on Celestia for data availability, utilizing Hyperlane for cross-chain interoperability. The network is powered by a single utility token, **$LGT**, which provides gas, staking, governance, and reward mechanisms across both protocols. Themisra introduces novel primitives including AI Battles, Prompt Chains with royalties, zero-knowledge confidential prompts, and a gamified prompt engineering ecosystem. Kleidon offers four core capabilities: subscription NFTs, gaming asset management, in-game currency creation, and white-label NFT marketplaces, deliverable natively on Ligate or on any EVM and Solana chain via Hyperlane bridging. Together, they represent a new category of blockchain infrastructure where human-AI collaboration is the fundamental unit of work.*

Keywords: Proof of Prompt, AI provenance, sovereign rollup, Sovereign SDK, Celestia, zero-knowledge proofs, Web3 infrastructure, NFT subscriptions, cross-chain, Hyperlane

2. Introduction

The rapid proliferation of large language models (LLMs) and generative AI systems has fundamentally transformed how humans create, communicate, and build software. In 2025 alone, an estimated 15 billion AI-generated outputs were produced daily across platforms such as ChatGPT, Claude, Gemini, and open-source alternatives. Yet despite this unprecedented volume of human-AI collaboration, the digital infrastructure to verify, attribute, and monetize these interactions remains entirely absent.

Simultaneously, the Web3 ecosystem continues to face fragmentation. Game studios, SaaS companies, and content creators seeking on-chain functionality must integrate multiple vendors -one for subscriptions, another for NFT minting, another for token deployment, and yet another for marketplace infrastructure. No single platform provides a unified solution, forcing developers to manage disparate SDKs, contracts, and APIs.

Ligate Labs addresses both of these gaps through a unified sovereign blockchain that hosts two complementary protocols, bound by a single token and shared infrastructure.

2.1 The Problem

In the AI domain, the following critical problems remain unsolved:

- **No provenance.** When a user writes a prompt and receives an AI-generated output, there is no verifiable record that this interaction occurred, who authored it, or which model produced the result.
- **No ownership.** Prompt engineers -individuals who craft sophisticated instructions to extract maximum value from AI systems -have no mechanism to prove authorship, license their work, or earn royalties.
- **No accountability.** AI-generated content circulates without attribution. Enterprises deploying AI agents have no audit trail. Disputes over AI outputs have no neutral arbiter.
- **No incentive alignment.** Users contribute billions of prompts to centralized platforms (OpenAI, Anthropic, Google) without compensation, while these platforms capture all the value.

In the Web3 infrastructure domain:

- **Fragmented tooling.** Unlock Protocol handles subscriptions. Thirdweb provides developer tools. Crossmint manages minting. Request Finance focuses on billing. No platform covers the full stack.
- **Complex integration.** Game studios building on-chain features must manage multiple SDKs, smart contract deployments across chains, and disparate dashboards.
- **No unified chain.** Projects deploy on Base, Ethereum, Polygon, or Solana independently, with no shared infrastructure or interoperability layer.

2.2 The Opportunity

Ligate Labs proposes a novel approach: a *sovereign blockchain* purpose-built for two complementary use cases, unified by shared infrastructure, shared security, and a shared token. Themisra Protocol creates a new asset class -the *verified prompt* -while Kleidon provides the

Web3 infrastructure layer that enables businesses to integrate on-chain functionality through a single SDK.

"The internet revolutionized the movement of information. Blockchain revolutionized the movement of value. Ligate revolutionizes the movement of intelligence."

3. The Ligate Network

The Ligate Network is a sovereign rollup built with the **Sovereign SDK**, utilizing **Celestia** as its data availability layer. Unlike traditional Layer 2 solutions that inherit and are constrained by their parent chain, the Ligate Network operates as a fully sovereign chain -maintaining its own consensus rules, governance, and execution environment while leveraging Celestia for cheap, scalable data storage.

3.1 Architecture Overview

The network architecture comprises four layers, each serving a distinct function within the protocol stack:

Layer	Component	Function
Execution	Sovereign SDK Runtime (Rust)	Processes transactions, executes Themisra and Kleidon module logic
Data Availability	Celestia	Stores raw transaction data for public verifiability at minimal cost
Interoperability	Hyperlane + Relay	Cross-chain messaging and liquidity bridging to Ethereum, Base, Polygon, Solana
User Access	Privy	Email and social login authentication; embedded wallets without MetaMask dependency
Monitoring	Grafana + Native Indexer + Swagger	Real-time metrics, fast data queries, auto-generated API documentation

Table 1: Ligate Network architecture layers and components.

3.2 Sovereign SDK and Celestia

The Sovereign SDK is a Rust-native framework for building sovereign rollups. Developers write business logic in standard Rust, and the SDK generates a complete full-node implementation with REST and WebSocket APIs, an indexer, auto-generated OpenAPI specifications, and a sequencer with automatic failover. The framework achieves P99 latency below 10 milliseconds and throughput exceeding 30,000 user operations per second -orders of magnitude faster than competing frameworks including the OP Stack, Arbitrum Orbit, and the Cosmos SDK.

Celestia serves as the data availability (DA) layer, providing a dedicated, low-cost storage solution for transaction data. Unlike traditional rollups that post all data to Ethereum at significant expense, the Ligate Network posts data to Celestia at approximately 1/100th the cost while maintaining equivalent verifiability guarantees. Any node operator can download data from Celestia and independently verify the integrity of the Ligate chain.

The sovereign architecture provides a critical advantage: *the Ligate Network is not controlled by or dependent on any parent chain.* Celestia functions purely as a data storage provider, not as a settlement or governance layer. The Ligate Network maintains full sovereignty over its consensus rules, upgrade mechanisms, and fee structures.

3.3 Cross-Chain via Hyperlane

Hyperlane, integrated natively within the Sovereign SDK, enables permissionless cross-chain messaging to any blockchain -both EVM-compatible chains (Ethereum, Base, Polygon, Arbitrum) and non-EVM chains (Solana). Relay, also integrated, provides shared liquidity bridging across connected chains.

This architecture creates a clear deployment hierarchy for Kleidon products: operators may deploy natively on the Ligate Network (lowest cost, highest performance, full feature access) or deploy on any connected chain via Hyperlane bridging. Themisra features, by contrast, are **Ligate-exclusive** -they are deeply integrated into the chain's execution layer and cannot be bridged to external chains. This exclusivity creates a natural incentive for users and operators to adopt the Ligate Network.

3.4 Zero-Knowledge Proofs

In Phase 2 of the protocol roadmap, the Ligate Network will integrate zero-knowledge (ZK) proving capabilities via **SP1** (by Succinct) or **RISC Zero**. Both frameworks allow developers to write standard Rust code and automatically generate ZK proofs, eliminating the need for specialized cryptographic languages such as Circom or Cairo.

ZK proofs enable *Confidential Prompts* -a Themisra feature allowing users to prove that a prompt was submitted at a specific time, by a specific wallet, to a specific AI model, without revealing the actual prompt or output content. This is critical for enterprise adoption, where prompts may constitute trade secrets or contain sensitive business logic.

The RISC Zero Boundless marketplace provides decentralized proof generation, eliminating the need for Ligate Labs to operate GPU infrastructure. Proof costs are estimated at $0.01–$0.05 per simple proof and $0.05–$0.20 for complex proofs with quality scoring.

4. Themisra Protocol - Proof of Prompt

Themisra is named after *Themis*, the Greek Titan of divine law, justice, and order -she who held the scales of truth before the gods. The protocol introduces the concept of **Proof of Prompt**: a cryptographically verifiable attestation that a specific human authored a specific prompt, which was processed by a specific AI model, producing a specific output, at a specific point in time.

"Themisra is to AI what Git is to source code -a verifiable, immutable record of creation, authorship, and lineage."

4.1 Core Mechanism

When a user submits a prompt through the Themisra interface, the following sequence executes:

1. **Submission.** The user composes a prompt and selects an AI model (Claude, GPT, Gemini, Llama, Mistral, or any supported model).
2. **Execution.** The Rust backend forwards the prompt to the selected model's API and receives the generated output.
3. **Proof Generation.** The backend constructs a proof package containing: SHA-256 hash of the prompt, SHA-256 hash of the output, model identifier and version, Unix timestamp, user wallet address, conversation ID, and message index.
4. **On-Chain Registration.** The proof package is submitted as a transaction to the Ligate Network, permanently recording the attestation.
5. **User Notification.** The user sees the AI response alongside the on-chain proof hash, block number, and timestamp in the interface.

Critically, only *hashes* of prompts and outputs are stored on-chain. The actual content is stored off-chain and can be deleted by the user at any time, ensuring compliance with GDPR right-to-erasure requirements. The on-chain proof remains valid regardless of whether the off-chain content exists.

4.2 AI Model Agnostic Design

Themisra is not coupled to any single AI provider. The protocol supports any model accessible via API, establishing itself as a *universal AI provenance layer* rather than a platform-specific wrapper. Supported models at launch include:

Provider	Models	Integration
Anthropic	Claude 4 Opus, Sonnet, Haiku	Native (primary launch partner)
OpenAI	GPT-4o, GPT-4.5, o3	API integration
Google	Gemini 2.5 Pro, Flash	API integration
Meta	Llama 4 (open source)	Self-hosted or API
Mistral	Mistral Large, Medium	API integration
Custom	Any model with an API endpoint	BYOK (Bring Your Own Key)

Table 2: Supported AI models at launch.

4.3 Feature Set

Themisra encompasses 32 features organized across five categories. Each feature is designed to create engagement loops, monetization pathways, and enterprise utility.

4.3.1 Core Infrastructure (10 features)

- **Prompt Registry** - Immutable on-chain record of prompt authorship with cryptographic timestamps.
- **AI Model Agnostic** - Universal support for Claude, GPT, Gemini, Llama, Mistral, and any API-accessible model.
- **Native Chat Interface** - Full-featured chat application with automatic proof generation per message.
- **External Proof API** - Notary service for AI interactions conducted on external platforms (ChatGPT, Claude.ai, etc.).
- **Sovereign Rollup** - Purpose-built chain on Sovereign SDK with Celestia DA.
- **$LGT Token** - Unified utility token for gas, staking, rewards, and governance.
- **Confidential Prompts** - Zero-knowledge proofs enabling verification without content disclosure (Phase 2).
- **Cross-Chain Bridges** - Hyperlane connectivity to Ethereum, Base, Polygon, Solana, and any chain.
- **Privy Authentication** - Email and social login with embedded wallets; no MetaMask required.
- **API Gateway** - Middleware layer between applications and AI models with automatic proof generation.

4.3.2 Creator Economy (9 features)

- **Prompt Marketplace** - Buy, sell, and license prompts with on-chain royalty enforcement.
- **Prompt Chains** - Composable prompt sequences where output from Prompt A feeds into Prompt B; original creators earn downstream royalties.
- **Prompt NFTs** - Utility-bearing NFTs representing prompt ownership; holders earn revenue when their prompts are reused.
- **Prompt Fingerprinting** - Semantic hashing to detect plagiarized or rephrased copies of existing prompts.
- **Prompt DAOs** - Collectively governed prompt collections with shared revenue distribution.
- **Prompt Staking** - Predictive staking on prompt quality; early backers of popular prompts earn proportional returns.
- **Prompt Inheritance** - Transferable prompt portfolios that continue generating revenue across wallet generations.
- **Prompt Remix** - Combine multiple existing prompts into new compositions; all original creators earn royalties.
- **Prompt Bounties** - Organizations post challenges with $LGT rewards for the best prompt solution.

4.3.3 Gamification and Social (7 features)

- **AI Battles** - 1v1 prompt competitions where users stake $LGT; community votes determine the winner.
- **Daily Prompt Challenges** - Scheduled challenges with rotating topics; top performers earn from a daily reward pool.
- **AI Model Tournaments** - Same prompt sent to multiple models simultaneously; community votes create on-chain model benchmarks.
- **Leaderboards and Reputation** - Categorical rankings (coding, writing, analysis, teaching) with verifiable on-chain scores.
- **Earn While You Chat** - Token rewards for every message, upvote, fork, and interaction on the platform.
- **Prompt Discovery Feed** - Algorithmic feed of trending prompts and outputs, optimized for engagement and discovery.
- **Real-Time Collaboration** - Multi-user prompt composition with shared cursors, version history, and split attribution.

4.3.4 Enterprise Applications (5 features)

- **AI Output Disputes** - Immutable record of exact prompts and outputs for conflict resolution; neither party can alter the evidence.
- **Verifiable AI Agents** - Full audit trail of autonomous AI agent actions, prompts, and decisions for enterprise compliance.
- **Team Workspaces** - Organization-level AI usage tracking with manager dashboards, shared prompt libraries, and compliance reporting.
- **AI Detector / Proof of Human** - Content created via Themisra carries provable AI origin; content without a proof is likely human-authored.
- **Prompt Insurance** - Decentralized insurance pool covering damages from harmful AI outputs; disputes settled by DAO jury.

4.3.5 Education (1 feature)

- **Learn-to-Earn Academy** - Structured courses in prompt engineering with on-chain quiz verification, token rewards for completion, and certificate NFTs for credentialing.

4.4 Gamification Layer

The gamification features serve a critical function beyond entertainment: they create the *daily engagement loop* necessary for protocol adoption. Without gamification, Themisra would be a niche infrastructure tool for proof-of-authorship. With gamification, it becomes a consumer application where users return daily to compete, earn, and discover.

The user acquisition flywheel operates as follows: AI Battles and Daily Challenges attract competitive users. Their best prompts surface on the Discovery Feed. Impressive outputs are shared on social media (Twitter/X). New users arrive, try a battle, earn their first $LGT, and enter the retention loop.

"ChatGPT pays you nothing. Themisra pays you for what you already do."

4.5 Enterprise Applications

Enterprise adoption is the primary revenue driver for Themisra. Three use cases have been identified as high-priority:

AI Compliance Auditing. As regulatory frameworks for AI mature (EU AI Act, proposed US legislation), enterprises will require verifiable records of AI usage. Themisra provides immutable proof of which prompts were used, which models generated outputs, and when interactions occurred -satisfying audit requirements without exposing proprietary prompt content (via ZK proofs).

AI Agent Accountability. Autonomous AI agents deployed in production environments (customer service, code generation, financial analysis) produce outputs without human oversight. Themisra's Verifiable AI Agents feature creates an on-chain audit trail of every agent action, enabling post-hoc review and accountability.

Intellectual Property Protection. Prompt engineers developing proprietary prompt libraries for enterprise clients can register their work on Themisra, establishing prior art and enabling royalty-based licensing through the Prompt Marketplace.

5. Kleidon - Web3 Infrastructure

Kleidon is a full-stack, multi-chain Web3 infrastructure platform built natively on the Ligate Network. It provides game studios, SaaS companies, and content creators with everything they need to integrate on-chain functionality -subscriptions, gaming assets, in-game currencies, and NFT marketplaces -through a single SDK, a single API, and a single operator dashboard.

"We bind your business to the chain."

Kleidon is **non-custodial by design**. All transactions execute through smart contracts. Kleidon never holds, manages, or has access to user funds or assets. This architectural decision eliminates money transmission regulatory requirements and reduces the compliance surface.

5.1 Feature Set

5.1.1 Subscription NFTs

Kleidon reimagines subscriptions as tradeable, transferable NFTs. Operators sell access passes that users actually own. Unlike traditional subscriptions locked to an account, these subscriptions can be transferred, resold on secondary markets, or gifted, generating ongoing royalty revenue for the operator on every secondary transaction.

- Subscriptions as ERC-1155 / Solana NFTs (or native Ligate format)
- Embeddable subscription widget (drop-in, white-label, customizable)
- Transferable and tradeable access passes with royalty enforcement
- Tiered plans, free trials, upgrade and downgrade flows
- Webhook events: subscribe, expire, transfer, cancel
- On-chain expiry enforcement requiring no backend infrastructure

5.1.2 Gaming Asset Management

Kleidon provides a fully-managed NFT collection system designed for game studios of all sizes, from AAA publishers like Ubisoft and Epic Games to independent developers. It handles collection creation, scheduled drops, dynamic metadata, and cross-game asset portability. Studios and players can create, trade, and monetize skins and in-game assets, with the platform earning a commission on every primary sale and secondary trade.

- Gaming skin and asset collection builder with visual editor
- Scheduled drops and bundle packs
- Dynamic NFTs with metadata that evolves based on gameplay (kills, rank, achievements)
- Cross-game asset recognition via a common metadata schema
- Unity C# and Unreal C++ SDKs for in-game wallet rendering and asset display
- On-chain rarity verification and provenance tracking
- Secondary market for player-to-player skin trading with royalty enforcement

5.1.3 In-Game Currency Creation

Kleidon enables no-code token deployment for game studios. Studios configure tokenomics, emission schedules, and exchange rates through a visual wizard, without writing a single line of

Solidity or Rust.

- No-code token deployment (native Ligate, ERC-20, or SPL)
- Configurable supply caps, minting limits, and burn mechanics
- Earn mechanics: quest rewards, match bonuses, referral tokens
- Anti-cheat controls: wallet velocity limits, on-chain audit logs
- Dashboard analytics: circulation, velocity, burn rate, holder distribution

5.1.4 White-Label NFT Marketplace

Kleidon provides a fully embeddable, white-label NFT marketplace. Operators own the brand, the smart contract, and the royalty stream. Both primary and secondary markets are unified in a single deployment.

- Primary sales: fixed price, auctions, and open editions
- Secondary market with configurable royalty enforcement
- Custom storefronts with operator-owned domain and branding
- Gasless minting via meta-transactions
- Multi-currency support: $LGT, ETH, MATIC, SOL
- Revenue split management for creators, platforms, and partners

5.2 Multi-Chain Deployment

All Kleidon products are available natively on the Ligate Network and deployable on any supported chain via Hyperlane. The operator selects their deployment chain during initial setup. Native Ligate deployment is incentivized through lower fees and access to Themisra integration features.

Chain	Deployment Method	Cost	Themisra Access
Ligate Network	Native (primary)	Lowest	Full access
Ethereum	Via Hyperlane bridge	Higher (ETH gas)	No
Base	Via Hyperlane bridge	Moderate	No
Polygon	Via Hyperlane bridge	Low	No
Solana	Via Hyperlane bridge	Low	No

Table 3: Kleidon multi-chain deployment options.

5.3 Target Markets

Segment	Features Used	Key Value Proposition
Game Studios	Gaming assets, in-game currency, NFT marketplace	Asset monetization, in-game economies, cross-game portability, skin trading revenue
SaaS Companies	Subscription NFTs	Tokenized subscriptions that users own and can trade

Segment	Features Used	Key Value Proposition
Content Creators	Subscription NFTs, NFT marketplace	Fan passes, digital collectibles, direct-to-fan monetization

Table 4: Kleidon target market segments.

6. Tokenomics - $LGT

The Ligate Network is powered by a single utility token, **$LGT**, which serves as the native gas token, staking mechanism, governance instrument, and reward currency across both Themisra and Kleidon. A unified token eliminates liquidity fragmentation and aligns incentives across the entire ecosystem.

6.1 Distribution

Total supply is fixed at **1,000,000,000 $LGT** (one billion tokens) with no inflationary mechanism beyond the initial distribution schedule.

Allocation	Percentage	Tokens	Vesting
Node Rewards	30%	300,000,000	Linear over 10 years
Team and Development	20%	200,000,000	4-year vest, 1-year cliff
Community and Airdrops	15%	150,000,000	Event-based distribution
Treasury (DAO)	15%	150,000,000	Governed by token holders
Early Investors	10%	100,000,000	2-year vest, 6-month cliff
Prompt Creator Rewards	10%	100,000,000	Distributed per engagement metrics

Table 5: $LGT token distribution.

6.2 Fee Structure

Transaction fees are distributed as follows:

Recipient	Percentage	Rationale
Sequencer Operators	40%	Compensation for transaction ordering and block production
Full Node Operators	30%	Compensation for data verification and API serving
Protocol Treasury	20%	Funds ongoing development, grants, and ecosystem growth
Burn	10%	Deflationary pressure; permanently removed from supply

Table 6: Transaction fee distribution.

Prompt reuse royalties (when a prompt is forked or purchased):

Recipient	Percentage
Original Prompt Creator	70%
Chain Operators	20%
Burn	10%

Table 7: Prompt reuse royalty distribution.

6.3 Node Incentives

Node operators are compensated through multiple revenue streams to ensure long-term network participation and decentralization:

- **Block rewards** - Decreasing emission curve from the 300M node reward allocation, incentivizing early participation.
- **Transaction fee share** - 70% of all transaction fees distributed between sequencer and full node operators.
- **Data serving fees** - Applications and users pay node operators for API queries and data retrieval.
- **Governance power** - Staked nodes participate in protocol governance votes.
- **Fraud detection bounties** - Rewards for identifying and proving sequencer misbehavior.

Earning opportunities for users:

Action	Reward
Send a prompt	0.1 $LGT
Receive an upvote	1.0 $LGT
Win an AI Battle	50 $LGT
Prompt gets forked	5 $LGT per fork
Daily Challenge top 10	100 $LGT
Complete Academy course	Variable
Run a full node	Block rewards + fee share

Table 8: User earning opportunities.

7. Competitive Analysis

Ligate Labs operates at the intersection of two markets -AI provenance and Web3 infrastructure -where no single competitor offers a comparable solution. The following analysis examines adjacent competitors in each domain.

7.1 Themisra Competitors

Project	What It Does	What It Lacks
Bittensor (TAO)	Decentralized AI model inference and training network	No prompt ownership, no provenance, no creator economy
Ritual	On-chain AI computation verification	No prompt registry, no marketplace, no gamification
Story Protocol	IP licensing and attribution on-chain	Focused on traditional IP, not AI-generated content
PromptLayer	Prompt versioning and management (Web2)	Centralized, no on-chain proof, no ownership
Tea Protocol	Proof of contribution for open source packages	Software packages only, not AI prompts

Table 9: Themisra competitive landscape.

No existing project combines prompt registration, AI model agnostic proofs, gamified engagement, a creator economy with royalties, and zero-knowledge privacy -all on a purpose-built sovereign chain.

7.2 Kleidon Competitors

Project	What It Does	What It Lacks
Unlock Protocol	On-chain subscription management	Subscriptions only; no gaming, no tokens, no marketplace
Thirdweb	Web3 developer tools and SDKs	Dev tools only; no subscriptions, no game-specific features
Crossmint	NFT minting and distribution	Minting only; no subscriptions, no in-game currencies
Sequence	Web3 gaming infrastructure	Gaming only; no subscriptions, no general Web3 tools

Table 10: Kleidon competitive landscape.

Kleidon is the only platform that unifies subscriptions, gaming assets, in-game currencies, and NFT marketplaces under a single API, SDK, and dashboard -deployed on its own sovereign chain with native cross-chain bridging.

8. Technology Stack

8.1 Ligate Network (Shared Infrastructure)

Component	Technology	Purpose
Blockchain Framework	Sovereign SDK (Rust)	Sovereign rollup execution environment
Data Availability	Celestia	Cheap, scalable transaction data storage
Cross-Chain	Hyperlane	Permissionless messaging to any chain
Shared Liquidity	Relay	Liquidity bridging across connected chains
Authentication	Privy (acquired by Stripe)	Email/social login, embedded wallets
ZK Proofs (Phase 2)	SP1 or RISC Zero / Boundless	Zero-knowledge proof generation
Monitoring	Grafana	Real-time logs and metrics
Indexing	Native Indexer	Fast, scalable data queries
API Documentation	Swagger	Auto-generated OpenAPI specs

Table 11: Ligate Network infrastructure.

8.2 Themisra Stack

Layer	Technology
Backend	Rust (Axum framework)
Frontend	React / Next.js
AI Integration	Anthropic SDK, OpenAI SDK, Google AI SDK, custom adapters
Database	PostgreSQL (off-chain metadata)
On-Chain Logic	Sovereign SDK custom modules (Rust)

Table 12: Themisra technology stack.

8.3 Kleidon Stack

Layer	Technology
Frontend (Dashboard)	Next.js 14, TypeScript, Tailwind CSS
Backend / API	Fastify, TypeScript, REST + Webhooks
Smart Contracts (Ligate)	Sovereign SDK modules, Rust
Smart Contracts (EVM)	Foundry, Solidity, ERC-1155, ERC-20
Smart Contracts (Solana)	Anchor, Rust, SPL tokens

Layer	Technology
SDK	JS/TS (npm), Unity C#, Unreal C++
Infrastructure	Docker, pnpm workspaces, Turborepo
Dev Tooling	CLI, Sandbox environment, Webhooks

Table 13: Kleidon technology stack.

9. Roadmap

Development proceeds in seven phases over approximately 16 months, with Themisra and Kleidon features developed in parallel on the shared Ligate Network infrastructure.

Phase	Timeline	Focus	Key Deliverables
1	Months 1–2	Foundation	Rust backend, Anthropic API integration, React frontend, chat interface, proof generation, Privy auth, Ligate testnet
2	Months 2–4	Gamification	Multi-model support (GPT, Gemini), AI Battles, Daily Challenges, Leaderboards, Discovery Feed, social sharing
3	Months 4–6	Own Chain + Token	Sovereign SDK rollup deployment, Celestia DA, $LGT token launch, node staking, Kleidon core contracts on Ligate testnet
4	Months 6–8	Creator Economy	Prompt Marketplace, Prompt NFTs, Prompt Chains with royalties, Bounties, Kleidon SDK (JS/TS, Unity, Unreal)
5	Months 8–10	ZK + Privacy	SP1 or RISC Zero integration, Confidential Prompts, enterprise privacy compliance, Kleidon NFT marketplace launch
6	Months 10–12	Enterprise	Team Workspaces, Verifiable AI Agents, AI Detector, API Gateway, Kleidon operator analytics dashboard
7	Months 12–16	Ecosystem	Hyperlane bridges (Ethereum, Base, Polygon, Solana), Prompt DAOs, Learn-to-Earn Academy, mobile app, decentralized sequencing

Table 14: Development roadmap.

10. Revenue Model

The Ligate ecosystem generates revenue through multiple complementary streams across both protocols, ensuring diversified income that scales with adoption.

10.1 Themisra Revenue Streams

- **Transaction fees** - Gas fees on every prompt submission and interaction.
- **Marketplace commission** - Percentage on every prompt sale and license transaction.
- **API Gateway fees** - Commission on API calls routed through the Themisra middleware.
- **Enterprise subscriptions** - Monthly fees for Team Workspaces, compliance dashboards, and SLA guarantees.
- **Battle entry fees** - Platform commission on AI Battle stakes.
- **Premium features** - Advanced analytics, priority model access, and enhanced visibility.
- **Prompt Insurance premiums** - Fees collected for the decentralized AI liability pool.
- **Learn-to-Earn sponsorships** - Sponsored courses from AI providers and enterprise partners.

10.2 Kleidon Revenue Streams

- **SaaS subscription** - Monthly platform fee for operator dashboard and API access.
- **Primary sales commission** - 2.5% on all primary NFT, subscription, and skin sales.
- **Secondary sales commission** - 1.0% on all secondary market transactions including player-to-player skin trades.
- **Gaming asset creation fees** - Commission on skin and asset collections created by studios and players on the platform.
- **In-game currency deployment fees** - One-time or recurring fees for token creation and management tools.

11. Risk Factors

Prospective participants should consider the following risk factors:

- **Regulatory risk.** Token classification may vary by jurisdiction. Changes in securities, AI, or data privacy regulations could impact operations.
- **Technology risk.** The Sovereign SDK is a relatively new framework. Bugs, performance issues, or architectural limitations may require significant engineering effort to resolve.
- **Market risk.** Demand for AI provenance and on-chain gaming infrastructure is nascent. Market adoption may be slower than projected.
- **Competition risk.** Well-funded competitors may enter the Proof of Prompt or Web3 gaming infrastructure space with larger teams and resources.
- **AI provider dependency.** Themisra relies on third-party AI model APIs (Anthropic, OpenAI, Google). Changes to API terms, pricing, or availability could impact service delivery.
- **Smart contract risk.** Despite auditing, smart contracts may contain undiscovered vulnerabilities that could result in loss of funds or protocol malfunction.
- **Adoption risk.** The success of the $LGT token and the Ligate Network depends on achieving critical mass in both user adoption and node operator participation.

12. Conclusion

Ligate Labs presents a unified vision for two of the most significant opportunities in the Web3 ecosystem: the verification and monetization of human-AI collaboration, and the simplification of on-chain infrastructure for mainstream businesses.

Themisra Protocol creates an entirely new category -*Proof of Prompt* -establishing cryptographic provenance for AI interactions and enabling a creator economy built around prompt engineering. With 32 features spanning gamification, enterprise compliance, and zero-knowledge privacy, Themisra transforms AI usage from a transient, unattributed activity into a verifiable, monetizable, and composable digital asset class.

Kleidon eliminates the integration complexity that prevents mainstream businesses from adopting Web3 technology, providing a single SDK that covers subscriptions, gaming assets, in-game currencies, and NFT marketplaces across any blockchain.

Both protocols share the Ligate Network -a sovereign rollup offering sovereign control, sub-cent transaction costs, and native cross-chain interoperability -unified by a single token, $LGT, that aligns the interests of users, creators, operators, and node operators across the entire ecosystem.

"The internet revolutionized the movement of information. Blockchain revolutionized the movement of value. Ligate revolutionizes the movement of intelligence."

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