



Haluk

LitePaper

1. Introduction

Haluk is an open-source, decentralized deployment platform for [ComfyUI](#) workflows, offering a “serverless hosting” experience and on-chain incentives. By leveraging the **BNB blockchain**, Haluk aligns network growth with transparent rewards for Node Providers contributing GPU resources. Through its native **\$HALUK** token, Haluk combines straightforward deployment tooling with **security**, **QoS assurances**, and **tokenomics** designed to foster long-term value for participants.

Key Features

1. **One-Click Deployments** – Deploy ComfyUI workflows seamlessly, reducing complexity for both novices and experienced AI developers.
 2. **Workflow Versioning & Management** – Tackle environment staging, version control, and custom node dependencies effortlessly.
 3. **Node Provider Rewards** – Secure, on-chain compensation in \$HALUK for GPU providers who maintain high uptime and reliable performance.
 4. **Built-in Tokenomics** – A carefully structured token distribution model with deflationary controls, governance capabilities, and rewards.
 5. **Regulatory & Compliance Roadmap** – Commitment to evolving legal and compliance requirements, essential for institutional and large-scale adoption.
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2. Architecture

Haluk’s architecture combines easy-to-use web deployment tools with on-chain incentive mechanisms:

1. Haluk Dashboard

- **Deploy & Manage:** Users manage ComfyUI workflows through an intuitive web interface.
- **Version Control:** Track multiple iterations, test them in a Staging environment, then push to Production seamlessly.
- **API Generation:** Automatic persistent endpoints upon successful deployment.

2. Node Providers

- **Contributing GPU Resources:** Individuals or entities install the Haluk plugin to register their servers.
- **On-Chain Reputation System:** Each node is assigned a performance-based reputation score, updated via smart contracts.
- **Mandatory Container Verification:** Image signing and proof-of-compute checks minimize risks of malicious or tampered deployments.

3. Haluk Network

- **Decentralized Coordination:** Maintains Node Provider reputations, monitors uptime, and allocates tasks to the best-performing nodes.
- **Service-Level Agreements (SLAs):** Smart contracts enforce uptime and performance standards. Nodes failing to meet SLAs may face reduced rewards or temporary delisting, ensuring Quality of Service (QoS).
- **Rewards & Penalties:** Nodes earn \$HALUK for successful workload completion; partial or missed workloads can trigger penalty mechanisms.

4. Web3 Integration

- **Wallet-Based Access:** Users can deploy workflows directly from crypto wallet-connected accounts.
 - **Regulatory & Compliance Readiness:** As the network grows, large Node Providers can opt into additional KYC/AML processes for enhanced trust and partnership opportunities.
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3. Core Components

3.1 Haluk Dashboard

- **User-Friendly Deployment:** Simplifies complex ComfyUI workflows into a few clicks.
- **Version Control & Rollback:** Seamlessly track and revert to older workflow versions.
- **API Generation:** Persistent endpoints for direct integration with apps and services.

3.2 Node Providers

- **Resource Scaling:** Integrate on-premise or cloud-based GPU servers (e.g., runpods, AWS).
- **Reputation & SLAs:** Nodes are continuously evaluated for performance, ensuring a high-quality network.
- **Compensation:** Rewards in \$HALUK correlate with node uptime, throughput, and task completion success rate.

3.3 Token (\$HALUK)

- **BEP-20 Standard:** Ensuring wide compatibility on the BNB chain.
 - **Utility & Governance:** Rewards Node Providers, and (in future releases) enables staking and decision-making via on-chain votes.
 - **Controlled Emissions:** Token distribution aligns with network growth and includes deflationary measures to preserve long-term value.
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4. Use Cases

1. **Rapid AI Prototyping**

- Ideal for quickly testing new ideas in generative tasks like image or text generation.
- Low setup overhead enables fast iteration.

2. **Production-Ready APIs**

- Versioned workflows are exposed via stable API endpoints suitable for enterprise-grade applications.

3. **Decentralized Render Farms**

- Distributing workloads across a global GPU network optimizes cost-efficiency and reduces single-point-of-failure risks.

4. **Load Balancing & Failover**

- Nodes with higher reputation are prioritized. If any node drops, tasks move automatically to other providers.
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5. Technical Overview

5.1 Tech Stack

- **Shadcn UI / Next.js** for the Haluk Dashboard.
- **Clerk** for user identity and authentication.
- **Neon / Vercel Postgres** (with **Drizzle** ORM) for the primary database.
- **R2 / S3** for object storage, ensuring easy retrieval of workflow artifacts and outputs.

5.2 Development & Self-Hosting

Clone the Repository

```
git clone https://github.com/malawadd/Haluk-project
```

```
cd ui/web
```

```
bun i
```

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 2. **Configure Environment**
 - Create a `.env.local` file, set `JWT_SECRET`, and obtain Clerk dev keys.
 3. **Database Setup**
 - Run `bun run db-dev` and `bun run migrate-local` to initialize the local database.
 4. **Start the Server**
 - `bun dev` launches the Next.js environment for development.
 5. **Production**
 - Use `next build && bun run migrate-production`, then deploy to platforms like Vercel for hosting.
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6. Node Provider Flow

1. Install & Register

- Download the Haluk plugin; your GPU server is verified and recorded on-chain.
- Automated container checks (integrity and proof-of-compute) ensure trust.

2. Add Machines

- Add machine details in the Haluk Dashboard, specifying any unique ComfyUI nodes.
- The network monitors throughput, reliability, and ties this to the node's on-chain reputation.

3. Monitor & Manage

- Real-time analytics of performance (throughput, concurrency) and health.
- SLAs: if performance degrades, the system may reassign tasks and reduce future rewards for underperforming nodes.

4. Reward Distribution

- \$HALUK payouts occur via smart contract. Nodes that meet or exceed SLA and performance metrics earn proportionally higher rewards.
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7. Roadmap

v0.1.0 Release

- **Security Enforcement:** Container image signing, sandboxing to prevent malicious code.
- **Enhanced Error Handling:** Better debugging tools for ComfyUI workflow issues.
- **Quality of Life Improvements:** Streamlined environment variable management and UI enhancements.
- **Advanced Load Balancing:** Intelligent routing based on node reputation scores.
- **Remote Machine Integration:** Smoother plug-and-play for new Node Providers.

Long-Term Goals

1. **Regulatory & Compliance Roadmap**
 - Gradual implementation of optional KYC/AML for large-scale Node Providers.
 - Ongoing legal counsel to ensure \$HALUK's compliance with global regulations.
 2. **Serverless GPU Partnerships**
 - Integrations with leading GPU hosting providers (e.g., runpods, AWS) for frictionless resource scaling.
 3. **Staking & Governance**
 - Introducing on-chain voting for parameter adjustments (emission rates, SLAs, buyback mechanisms).
 4. **Real-Time Logging & Debugging**
 - Websocket-based updates for image generation and performance monitoring.
 5. **Adoption & Market Penetration**
 - Dedicated marketing and business development to onboard enterprise clients, academic institutions, and large AI projects.
 - Ongoing grants, hackathons, and co-marketing campaigns to expand the AI developer community.
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8. Tokenomics

8.1 Overview

\$HALUK powers the Haluk network by rewarding Node Providers for their GPU contributions and facilitating on-chain governance. It follows a **BEP-20** standard for broad compatibility within the BNB chain ecosystem.

8.2 Supply & Distribution

- **Max Supply:** 100,000,000 \$HALUK
- **Initial Circulating Supply:** ~10% of the max supply (final structure subject to community governance)

Allocation Breakdown

1. **Node Rewards (40%)**
 - Gradually released as the network scales, aligning emissions with usage.
2. **Ecosystem Growth & DAO Treasury (20%)**
 - Funds ongoing development, hackathons, marketing, and community-building efforts.
3. **Liquidity & Market-Making (15%)**
 - Ensures stable trading conditions and reduces volatility on DEXs and CEXs.
4. **Team & Advisors (10%)**
 - Vested over multiple years (e.g., 12-month cliff, monthly unlocks) for long-term commitment.
5. **Strategic Partnerships (10%)**
 - Fuels integrations that expand Haluk's presence and cross-chain utility.
6. **Marketing & Community (5%)**
 - Supports campaigns, educational programs, and user acquisition.

8.3 Emission Model

- **Controlled Emissions:** The largest portion of rewards is allocated for Node Providers.
- **Halving Epochs (Proposed):** Emissions may halve periodically to prevent runaway inflation and increase token scarcity.

8.4 Utility & Use Cases

1. **Node Provider Compensation**
 - Main function: paying GPU operators based on workloads processed.
2. **Staking & Governance**
 - Allows token holders to propose and vote on network parameters (emission rates, buyback-and-burn, treasury usage).
3. **Network Fees & Discounts**
 - Potential premium services and advanced analytics may be unlocked or discounted with \$HALUK.

8.5 Vesting & Locks

- **Team & Advisor Tokens:** Subject to a standard vesting schedule to align long-term incentives.
- **Strategic Partnerships:** Tokens may have 6–12 month lock-ups to prevent short-term dumping and ensure dedicated partnership.

8.6 Deflationary & Sustainability Mechanics

1. **Buyback & Burn (Potential)**
 - A portion of DAO treasury or network fees could be directed to acquiring \$HALUK on the open market and burning it to reduce circulating supply.
 2. **Ecosystem DAO**
 - Community-driven governance that can revise emission rates, introduce new utility features, or adjust SLAs to keep the network competitive.
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9. Competition & Differentiation

- **Competitive Analysis:** Haluk's unique proposition lies in its decentralized architecture, built-in token incentives, and frictionless workflow deployment. Unlike centralized AI compute services, Haluk uses a **global GPU marketplace** whose operations and rewards are transparent on-chain.
 - **Ongoing R&D:** The Haluk team, along with community contributors, continually iterates on user experience, security, and performance—ensuring the platform remains ahead of emerging rivals.
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10. Conclusion

Haluk is forging a new path for decentralized GPU compute and ComfyUI workflow deployment, balancing user-friendly interfaces with robust security, QoS guarantees, and sustainable tokenomics. By resolving common vulnerabilities—such as lack of Node Provider reputation checks, minimal SLA enforcement, regulatory ambiguity, uncertain adoption paths, weak differentiation, and unmanaged token inflation—Haluk has built a **resilient** foundation for growth.

- **Security & Trust:** On-chain reputation, container verification, and proof-of-compute ensure Node Providers are reliable.
- **QoS & SLAs:** Smart contracts govern uptime and performance expectations, applying penalties or rerouting tasks when needed.
- **Regulatory Compliance:** A Legal Roadmap with optional KYC/AML for large Node Providers cultivates mainstream and institutional trust.
- **Adoption & Market Penetration:** Targeted marketing, partnerships, and hackathons broaden the user base, from hobbyists to enterprise.
- **Competition & Differentiation:** Haluk's decentralized framework, incentive mechanisms, and user experience set it apart in a crowded AI compute market.
- **Tokenomics & Long-Term Value:** Controlled emissions, halving epochs, staking, and potential buyback-and-burn programs protect \$HALUK's value.