NOMAD AUTARCHY

nomadautarchy.com

A Peer-to-Peer GPU Computing Network

with Privacy-by-Design and Checkpoint-Based Verification

Technical Whitepaper — v0.1
March 2026 | Confidential

Confidential — For Prospective Investors & Strategic Partners

Executive Summary

> *Nomad Autarchy is the first peer-to-peer GPU computing network built for digital nomads, creative professionals, and smart workers — with absolute privacy, zero central cloud dependency, and stablecoin-native settlement.*

The global cloud GPU market is valued at $8 billion today and is projected to exceed $50 billion by 2030. Yet every major provider — AWS, GCP, Azure, CoreWeave — is centralised, expensive, and incompatible with privacy. Decentralised competitors such as io.net, Render Network, and Akash Network serve only developers and ML engineers, ignoring the 35+ million digital nomads and 3.2 billion gamers who need GPU access in a consumer-grade, friction-free product.

Nomad Autarchy closes this gap with three technical innovations working in concert:

- Shamir Secret Sharing shards — no single node ever holds a complete file
- Nomad Autarchy Sync-Point Protocol (NHSP) — cryptographic checkpoints that detect malicious nodes mid-job, not at completion
- Blind verifier spot-checking — a randomly selected verifier node independently re-runs a micro-task at each checkpoint without knowing the expected result

Stablecoin settlement is the natural payment layer for this network. It is already trusted by the demographic Nomad Autarchy serves, borderless in the way nomadic workers need, and immune to the volatility that makes proprietary tokens unsuitable for real-economy transactions. Every GPU job, every checkpoint payment, every provider payout settles in stablecoin — creating a high-frequency, real-economy utility layer with no speculative exposure.

We are seeking a seed investment in the range of $500K–$2M and a strategic partnership with a stablecoin issuer or infrastructure investor to integrate stablecoin settlement as the platform's native currency and fund the MVP and initial network bootstrap.

1. The Problem

1.1 GPU Access is Centralised and Surveilled

Every major cloud computing provider operates as a black box. When a video editor renders a 4K project on AWS, Amazon holds the file, processes it on its own infrastructure, and retains the right to inspect that data under its terms of service. The user has no meaningful privacy guarantee. For a journalist processing footage in an authoritarian country, a product designer protecting unreleased IP, or a game developer iterating on an unannounced title, this is not acceptable.

Furthermore, centralised cloud GPU is expensive by design. AWS and GCP price their GPU instances to extract maximum margin from enterprise customers. A single A100 instance costs $32/hour. Nomad workers — who need GPU access intermittently, not on a monthly SaaS contract — are simply not the intended customer.

1.2 Decentralised Alternatives Are Not Consumer-Ready

The emerging decentralised GPU market (io.net, Render Network, Golem, Akash) has made real technical progress, but every player targets developers and ML engineers. Their onboarding requires Docker knowledge, CLI fluency, and familiarity with crypto wallets. There is no product in this space that a video editor, a game streamer, or a smart worker without engineering experience can use without a steep learning curve.

1.3 Billions of GPU Cycles Go Unused Every Night

An estimated 500 million gaming PCs worldwide contain GPUs capable of professional-grade rendering and AI inference. The majority of these GPUs are idle for 10–16 hours per day. Their owners would gladly monetise this idle compute if the process were simple, secure, and rewarded in stable, liquid currency — not a speculative token.

Problem	Current Solution	Why It Fails
Privacy in cloud compute	Trust AWS/GCP TOS	Centralised, surveillable, jurisdiction-exposed
Consumer GPU access	Buy expensive hardware	CapEx, outdated quickly, idle 70% of time
Decentralised compute	io.net / Akash / Golem	Developer-only, no consumer UX, complex onboarding
Idle GPU monetisation	Mining (declining ROI)	Energy-intensive, requires technical setup, unstable income
Borderless GPU payments	Credit card / bank wire	Blocked in 40+ countries, slow settlement, high fees

2. The Solution — Nomad Autarchy

2.1 Core Concept

Nomad Autarchy is a peer-to-peer marketplace where GPU owners (Providers) offer their idle computing power to people who need it (Consumers), with every transaction settled in stablecoin. The platform is designed for three primary user personas:

- The Provider — a gamer, home user, or small studio with a high-end GPU who wants passive income during idle hours
- The Consumer — a digital nomad, creative professional, or smart worker who needs GPU power on demand without a cloud subscription
- The Verifier — a Provider who earns micro-rewards by performing blind spot-checks that guarantee the network's integrity

2.2 Privacy Architecture — No Central Visibility

The central architectural principle of Nomad Autarchy is that no single entity — not a Provider node, not a Verifier, not Nomad Autarchy itself — can ever see a Consumer's complete data. This is achieved through a five-layer privacy stack:

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LAYER 1 — Client-side encryption
  File is encrypted locally with the Consumer's private key before leaving their
device.
  The raw file never touches any server or network node.

LAYER 2 — Shamir Secret Sharing (data sharding)
  Encrypted file is split into K shards. At least M shards are required to
reconstruct.
  Example: split into 5 shards, require 3 to reconstruct (3-of-5 threshold).
  Each Provider node receives exactly one shard — mathematically incapable of
  reconstructing the file alone.

LAYER 3 — Execution isolation
  Each Provider node decrypts its shard only in RAM, inside a Docker container
  with network egress blocked. The node cannot exfiltrate data during computation.

LAYER 4 — Hash-only checkpoint verification
  The Coordinator verifies computation integrity via cryptographic hashes only.
  It never sees the content — only the fingerprint of progress.

LAYER 5 — Client-side output reassembly
  Only the Consumer, using their private key, reassembles output shards.
  No third party participates in or observes this step.
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The result is a system where privacy is not a policy promise — it is a mathematical guarantee.

3. Nomad Autarchy Sync-Point Protocol (NHSP v0.1)

3.1 The Problem with End-of-Job Verification

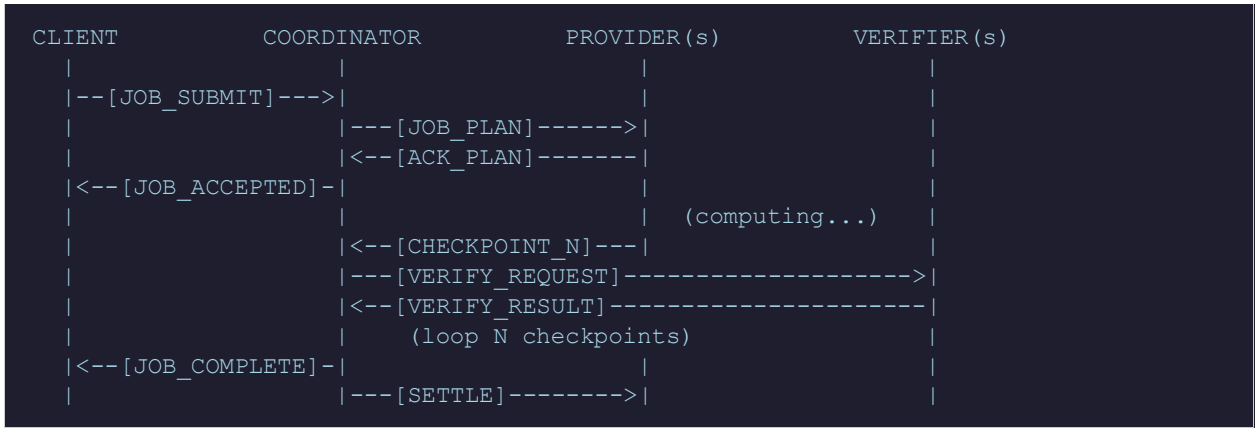
In conventional distributed computing, job integrity is checked only at completion. If a malicious node corrupts its output at step 18 of a 20-step job, the Consumer discovers the problem only after waiting for the full computation — wasting time, energy, and money. The fraudulent node may have already been paid.

NHSP solves this with a system of cryptographic checkpoints (sync-points) inserted throughout job execution. A malicious node is detected at checkpoint 9 — not at the final step 20. The job is resumed from the last valid checkpoint, not from zero.

3.2 Network Entities

Entity	Role	Incentive
Client (Consumer)	Submits jobs, receives output, pays in stablecoin	GPU access without cloud subscription
Coordinator	Orchestrates job distribution and checkpoint verification	Platform fee per job (v1 centralised, v2 decentralised)
Provider Node	Executes computation on GPU, reports checkpoints	Stablecoin payment per completed checkpoint
Verifier Node	Performs blind spot-checks at each checkpoint	Micro stablecoin reward per verification

3.3 Job Lifecycle



3.4 The Checkpoint Message — CHECKPOINT_N

The central message of NHSP is the checkpoint report, sent by every Provider at each sync-point. It contains:

- progress_pct — percentage of assigned shard completed
- output_hash — SHA-256 hash of the partial output to this point

- state_hash — SHA-256 hash of the internal computation state
- merkle_root — root of the Merkle tree of all checkpoints 1 through N
- merkle_proof — proof that checkpoint N derives from checkpoint N-1 (chain integrity)
- resource_telemetry — GPU utilisation, VRAM, temperature, power draw

The Merkle proof is critical: it is cryptographically impossible for a Provider to falsify checkpoint N without invalidating the chain from checkpoint 1. Tampering is detected immediately — not retrospectively.

3.5 Blind Verifier Spot-Checking

Upon receiving a checkpoint, the Coordinator selects a Verifier node at random — unknown to the Provider — and sends it a micro-task: a small subset of the same shard computation (approximately 5% of the total). The Verifier receives no information about the expected output.

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Provider reports checkpoint 9:
  output_hash: sha256:cc3f...

Coordinator sends micro-task to random Verifier V (Provider does not know):
  - Verifier receives: encrypted micro-shard + decryption key
  - Verifier does NOT receive: the expected output hash

Verifier computes and returns:
  output_hash: sha256:cc3f...   <- MATCH -> checkpoint validated
  output_hash: sha256:9d2a...   <- MISMATCH -> fault investigation begins

If mismatch: Coordinator sends to a third tie-breaker node.
Majority (2 of 3) wins. Minority node is penalised.
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Blind verification prevents collusion: the Verifier cannot adjust its answer to match the Provider because it never receives the expected answer before computing.

3.6 Fault Response

When a Provider node is found faulty at checkpoint N:

- Payment for the current job is withheld entirely
- A portion of the Provider's stake is slashed (e.g., 10% of job value)
- Reputation score decreases by 50 points
- Node enters a ban period proportional to fault severity
- Job is redistributed to a replacement node starting from checkpoint N-1 — not from zero

The recovery-from-checkpoint mechanism is a significant differentiator: fault tolerance is achieved without discarding prior valid computation.

4. Stablecoin-Native Settlement

4.1 Why Stablecoin — Not a New Token

Nomad Autarchy will not launch a proprietary token. The rationale is straightforward: speculative tokens misalign incentives. A Provider whose earnings are denominated in a volatile asset faces income uncertainty that undermines the network's value proposition. A Consumer whose payments are denominated in a speculative token faces friction and cost unpredictability.

A major stablecoin (USDT, USDC, or equivalent) solves both problems. It is:

- The most widely held and liquid settlement instruments in the crypto economy, with hundreds of billions in combined circulation
- Already trusted and used by the digital nomad and crypto-adjacent demographics Nomad Autarchy targets
- Borderless — a Provider in Indonesia and a Consumer in Portugal settle instantly without banking infrastructure
- Stable — a Provider can plan their earnings; a Consumer can predict their costs

> *For any stablecoin issuer or infrastructure partner: every GPU job settled on Nomad Autarchy is a stablecoin transaction. The network creates a new, high-frequency, real-economy use case — not speculation, but computation. This is the kind of organic, utility-driven volume that no financial incentive can manufacture.*

4.2 Payment Flow

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1. Consumer submits job. Full payment placed in escrow (stablecoin).

2. Per checkpoint validated:
   Provider earns: (total_payment / total_checkpoints) × checkpoint_index
   Verifier earns: micro-reward (e.g. 2% of checkpoint value, paid in stablecoin)

3. Job completed successfully:
   Provider receives: remaining escrowed stablecoin balance
   Verifiers receive: accumulated micro-rewards

4. Job failed at checkpoint N:
   Consumer receives: refund proportional to failed work
   Provider: receives nothing + stake slashed
   Replacement node: receives payment for remaining work
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4.3 Stake System

Every Provider deposits a USDT stake before joining the active pool. The stake amount scales with GPU tier:

GPU Tier	Example Hardware	Required Stake	Max Concurrent Jobs
Entry	RTX 3060 / 8GB VRAM	$5	1

Mid	RTX 4070 / 12GB VRAM	$10	2
High	RTX 4090 / 24GB VRAM	$25	4
Pro	A100 / 80GB VRAM	$100	8

The stake creates a real economic cost for malicious behaviour. A Provider with a $25 stake who defrauds a job worth $2 loses both the job payment and a portion of their stake — making systematic fraud economically irrational.

5. Competitive Positioning

5.1 Market Landscape

Platform	Focus	Target User	Privacy	Consumer UX	Stablecoin Native
AWS / GCP / Azure	General cloud compute	Enterprise	None	Moderate	No
io.net	AI/ML inference	ML engineers	None	Developer-only	No
Render Network	3D rendering	3D artists (pro)	None	Moderate	No
Akash Network	Dev infrastructure	DevOps / SRE	None	CLI only	No
Golem	General compute	Researchers / dev	None	CLI only	No
Vast.ai	GPU rental	AI hobbyists	None	Moderate	No
Nomad Autarchy	All GPU workloads	Nomads / creatives	By design	Consumer-first	Yes

5.2 Competitor Analysis — Why Nomad Autarchy Is Different

Render Network

Render Network demonstrated something important: professionals will pay for distributed GPU rendering, and a decentralised model can work at scale. That market validation is real and useful. However, Render is a centralised job dispatcher for a single vertical — 3D rendering with Octane and Blender — serving a narrow professional niche. Its architecture has no data privacy layer: Provider nodes receive and process complete user files with no sharding or encryption. There is no mid-job verification protocol — integrity is assessed only at completion, after the full computational cost has been paid. Its native RENDER token introduces speculative volatility that misaligns provider incentives and creates friction for non-crypto users. Nomad Autarchy is not a competitor to Render in its own vertical. It is the horizontal infrastructure layer that Render never attempted to build — one that serves any GPU workload, any user, with privacy guarantees Render cannot offer.

io.net

io.net is technically ambitious, aggregating GPU clusters from data centres and miners to serve AI and ML inference workloads. Its architecture is sophisticated but its product is exclusively developer-facing: onboarding requires Docker, CLI fluency, and engineering knowledge. Privacy is not a design consideration — io.net is built for throughput, not confidentiality. Its target customer is an ML engineer running model training jobs, not a video editor protecting unreleased footage or a journalist processing sensitive material. Furthermore, io.net pools GPU resources into unified clusters, meaning individual consumer hardware is largely excluded from the supply side. Nomad Autarchy's horizontal node

architecture — where each GPU serves independently — is structurally different and opens the supply side to the 500 million gaming PCs that io.net cannot reach.

Vast.ai

Vast.ai is the closest existing product to a GPU rental marketplace, offering an interface where users can rent individual GPU instances by the hour. Its UX is more accessible than Akash or Golem, but it remains a DIY platform: users SSH into rented machines, configure their own environments, and manage their own jobs. There is no privacy architecture — the Provider has full access to the Consumer's workload environment. There is no checkpoint verification protocol. Payments are processed via credit card or crypto with no stablecoin-native settlement. Vast.ai is a tool for technically capable users comfortable with server administration. Nomad Autarchy targets the majority who are not.

5.3 The Unoccupied Position

The gap Nomad Autarchy fills is precise: a consumer-grade, privacy-by-design, GPU sharing marketplace for the non-developer creative economy. No competitor occupies this space. The closest is Salad.com, which recruits consumers as GPU providers but does not serve them as consumers.

Nomad Autarchy is the first product where the same person can be both a Provider (earning stablecoin with their gaming GPU at night) and a Consumer (using network GPU for work during the day). This bilateral participation model creates a flywheel: the more providers join, the better the consumer experience; the more consumers pay, the higher the provider earnings.

6. MVP Scope and Roadmap

6.1 MVP Philosophy

The MVP focuses on a single use case executed with exceptional quality: asynchronous job processing for video rendering and AI image/video generation. This choice is deliberate:

- Asynchronous workflow is architecturally simpler than real-time streaming
- Demand is immediate and large (Stable Diffusion, Runway, video editors)
- Privacy value proposition is clearest for creative IP protection
- Stablecoin settlement works cleanly without latency-sensitive payment requirements

6.2 MVP Feature Set — 4 Months

Component	Description	Priority
Provider Daemon	Windows/Linux installer, auto GPU detection, Docker sandbox, earnings dashboard	P0
Consumer Client	Web dashboard, file upload, job submission, progress tracking, output download	P0
NHSP Core	Checkpoint protocol, Merkle verification, blind spot-check system	P0
Privacy Layer	Client-side encryption, Shamir sharding (3-of-5), execution isolation	P0
Stablecoin Settlement	Stripe on-ramp, stablecoin escrow, per-checkpoint payouts, provider withdrawals	P0
Reputation System	Score per checkpoint pass/fail, stake deposit/slash, ban enforcement	P1
Matching Engine	VRAM requirement matching, latency/region preference, reputation filtering	P1
Mobile App	Excluded — v2	Out of scope
Gaming Streaming	Excluded — v2	Out of scope
ZK Proofs	Excluded — v2	Out of scope

6.3 Technical Stack

Layer	Technology	Rationale
P2P Networking	libp2p	Battle-tested, DHT-based P2P protocol — same foundation used by IPFS and major decentralised networks
Provider Daemon	Python + Docker + CUDA	Native CUDA integration, broad GPU driver support
Backend / Coordinator	Go + Fastify	Performance, concurrency for job orchestration

Frontend	Next.js + Tailwind	Fast iteration, consumer-grade UX
Encryption	libsodium (age encryption)	Industry-standard, audited, open source
Secret Sharing	Shamir implementation (ssss-lib)	Proven, constant-time, resistant to side-channel
Database	PostgreSQL + Redis	Job state, reputation scores, queue management
Payments	Stablecoin (Tron / Ethereum L2) + Stripe	Stablecoin native, fiat on-ramp for non-crypto users
Execution Sandbox	gVisor + Docker	Kernel-level isolation, prevents egress during computation

6.4 Milestone Timeline

Month	Milestone	Key Deliverable
Month 1	Provider foundation	GPU daemon, Docker sandbox, CUDA detection, local benchmark
Month 2	Job workflow	Consumer upload, NHSP checkpoint loop, basic matching engine
Month 3	Privacy + payments	Full sharding stack, stablecoin escrow, per-checkpoint settlement, stake system
Month 4	Beta	Private beta: 50 providers, 200 consumers, 500+ jobs processed
Month 6	Public launch	Open network, stablecoin payouts live, community onboarding
Month 9	v2 planning	Gaming streaming prototype, ZK proof research, coordinator decentralisation

7. Investment & Partnership Opportunity

7.1 What We Are Looking For

Nomad Autarchy is seeking two things simultaneously: a seed investment and a strategic settlement partner. These can come from the same party or independently.

7.2 Seed Investment — $500K to $2M

The seed round funds four months of MVP development, initial network bootstrap, and the first 50-provider beta. Investors receive equity in the operating company and board observer rights. Use of funds:

- Engineering team: protocol implementation (NHSP), provider daemon, consumer client — 60%
- Infrastructure: coordinator servers, security audits, testnet — 20%
- Community and growth: nomad hub cities onboarding, content, partnerships — 15%
- Legal and compliance: entity structure, IP protection, regulatory review — 5%

7.3 Strategic Settlement Partnership

Nomad Autarchy's payment layer is designed to be stablecoin-native from day one. We are seeking a partnership with a stablecoin issuer or infrastructure provider to become the exclusive settlement currency of the network at launch. The strategic value for the partner is clear: every GPU job processed on Nomad Autarchy generates a real, utility-driven stablecoin transaction — not speculative volume, but productive economic activity at the intersection of compute, privacy, and the global nomadic workforce.

In exchange for becoming the network's settlement currency, the partner receives:

- Exclusive settlement status at network launch
- Prominent co-branding across all consumer-facing product surfaces
- Observer board seat and quarterly technical briefings
- Revenue share: 0.5% of all transaction volume
- Joint announcement at network launch and at relevant industry events

7.4 Why This Investment Makes Sense Now

The decentralised GPU compute market is in its formation phase. The window to establish a consumer-grade, privacy-first network with stablecoin-native settlement is open today — it will not remain open once a well-funded competitor pivots into this space. The technical moat (NHSP protocol, sharding architecture) is real and documented. The market need is validated by the growth of every competitor in this space. The missing piece is execution capital.

> *Nomad Autarchy is not asking an investor to bet on an idea. It is asking an investor to fund the construction of infrastructure whose architecture is already designed, whose market gap*

> *is already proven, and whose settlement layer creates compounding utility for any stablecoin partner from day one.*

8. Conclusion

The GPU computing market is at an inflection point. The centralised model — expensive, surveilled, inaccessible to the non-developer majority — is structurally vulnerable to a privacy-first, peer-to-peer alternative. The decentralised market exists but has failed to produce a consumer-grade product.

Nomad Autarchy addresses this with a technically rigorous architecture: Shamir sharding for privacy, NHSP checkpoint verification for integrity, and USDT for seamless global settlement. The result is a network where no central party — including Nomad Autarchy itself — can observe what users compute.

Stablecoin settlement is not an afterthought in this design. It is the economic substrate of the network: the currency in which trust is staked, work is rewarded, and disputes are settled. Every GPU job processed on Nomad Autarchy is a real, utility-driven transaction in the productive economy — not speculation.

> *Nomad Autarchy is the infrastructure layer the decentralised compute market is missing: private, verifiable, consumer-grade — with stablecoin settlement as the native currency of productive work. The architecture is ready. The market gap is proven. The opportunity is now.*

We welcome the opportunity to discuss this further at your convenience.

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