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Nesa Technology

Experience fully decentralized AI.

Nesa is the first network to execute decentralized model querying. We containerize AI models and query templates on-chain, host an ecosystem of augmentative off-chain services from Vector storage to RAG, and supply a network of NES miners for execution. Miners pull containers, run them locally on decentralized compute provided by Nesa's partners, and instantly reach validation consensus, reporting the query response on chain in a fully privacy-preserving transaction using ZK proof.

Get Started →

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Model Execution

AIVM Consensus
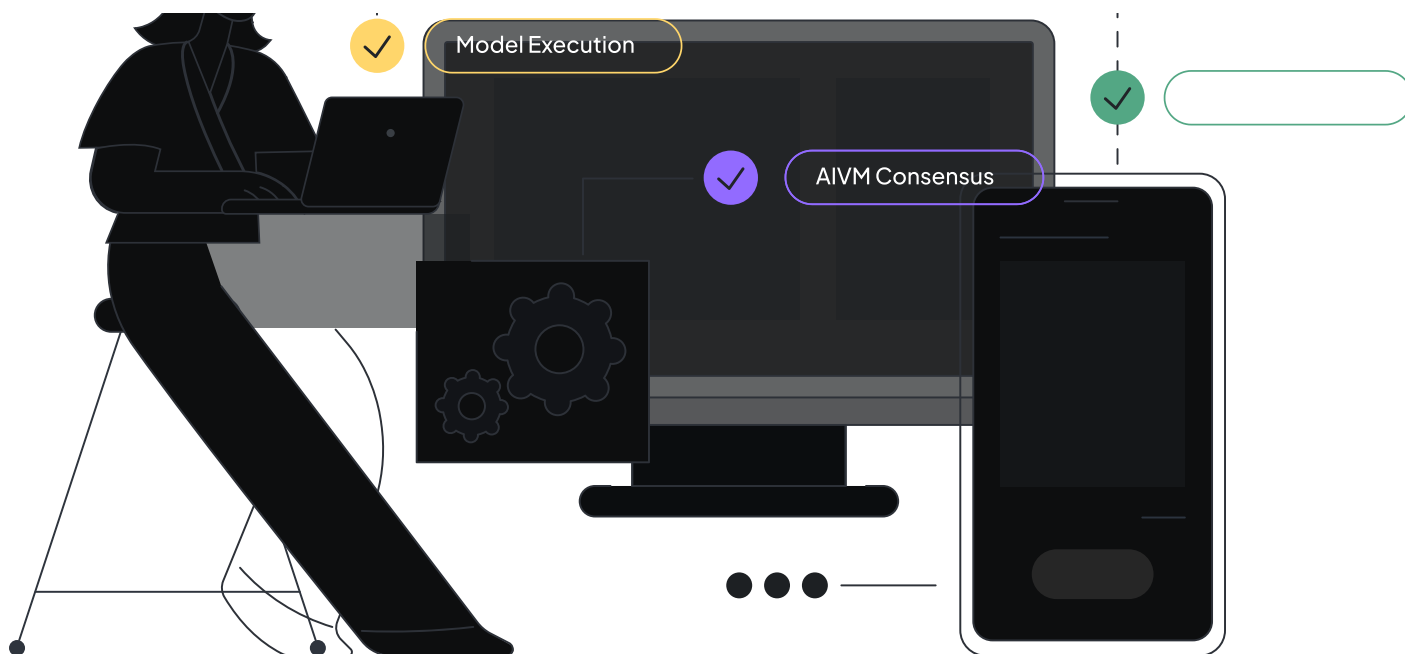
NESA CAPABILITIES

Introducing the AIVM

Nesa has pioneered the AIVM, the world's first AI virtual machine network for running inference queries on-chain.

Trust

Privacy

Standardization

Trusted Execution

Special nodes in the network enhanced with attestation TEEs

Leading Privacy

SMPC for privacy-preserving computation,

Standardization akin to Ethereum EVM

A standardized and secure execution environment analogous to the Ethereum Virtual Machine's (EVM) role in Ethereum

for secret share   with ZKP

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Speed   Robustness   Customization

2 Phase Transactions

Inference Request Queueing for high throughput and low latency execution.

Robust Inference Committee Selection

A fair and secure methodology for inference committee selection using VRF, inspired by organizational structure of duties in Ethereum 2.0.

Custom Aggregation

Flexibility in how inference results are aggregated for final output.

Model Config Specificity

Model consistency and inference reliability are the linchpins of the AIVM. To achieve uniform model execution, the AIVM configuration charters every aspect that could

influence the computational
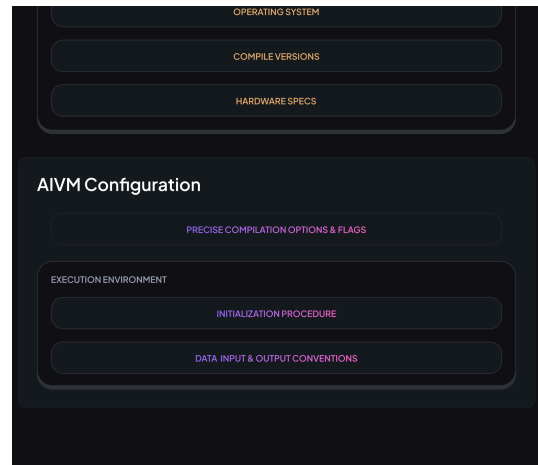
compilation options, and flags. By rigorously defining the execution environment, Nesa eliminates variability across AI stacks.

Explore More

Decentralized Inference

Trust in inference is another keystone to the AIVM network. To achieve this, the execution protocol within the AIVM prescribes a series of steps that every node must follow. This protocol includes initialization procedures, data input conventions, model execution, and output handling. By standardizing the execution flow, the network reliably predicts and replicates the behavior of AI models in realtime.

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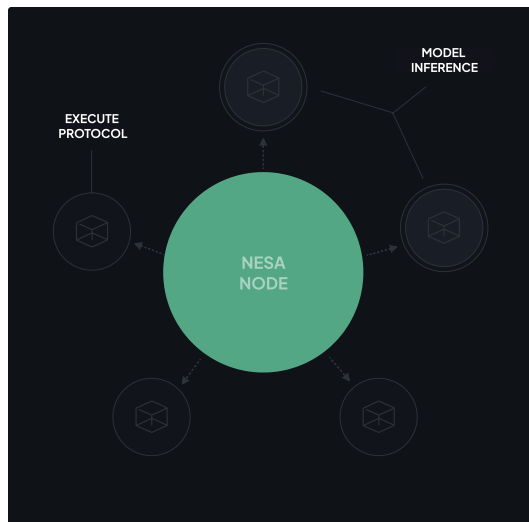
Hybrid Enhanced ZK Privacy

A pioneering feature within the AIVM network is Nesa's hybrid enhanced privacy system. This framework leverages a two-phase transaction structure, utilizing the commit-reveal paradigm, to safeguard against dishonest behavior and free-riding. This ensures that nodes are incentivized to perform their computations honestly and that users can trust the integrity of the inference results.

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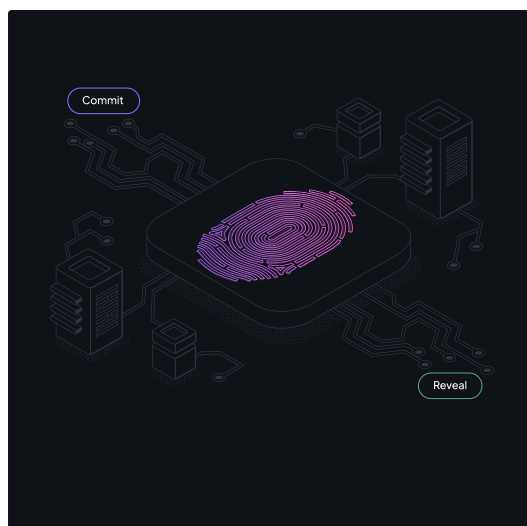
VRF & Pseudo-random seed

Many AI models introduce randomness during inference, which can pose a challenge for achieving deterministic and reproducible results. The AIVM network mitigates this by fixing the random seed, ensuring that any pseudo-random number generation during inference leads to the same sequence across all executions. In scenarios where public randomness is necessary, we integrate Verifiable Random Functions (VRFs) that produce randomness that is both unpredictable and provably unbiased.

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Kernel Validation

Testing

Before an AIVM kernel is approved for storage on the blockchain, it undergoes rigorous validation to ensure compliance with the specified config template and to confirm that it yields consistent results across diverse environments. A suite of tests is run in simulated multi-node scenarios by a Neural Arbiter Network (NAN) to affirm that the kernel's execution is deterministic and immune to variances in the underlying systems.

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NESA ARCHITECTURE

A Uniform Execution Environment

The AIVM architecture facilitates uniform execution across all nodes, analogous to the role played by the Ethereum Virtual Machine (EVM) in the Ethereum ecosystem.

Model Parameters

The weights and biases that define the AI model hosted on-chain. These parameters containerized within the execution environment are the product of the training process, and they dictate the model's behavior, purpose, and capabilities.

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AIVM Configuration File

Functionally similar to a Dockerfile, this file contains the specifications for the virtual environment in which the model will execute. This includes dependencies, libraries, and runtime needed needed on every node to execute with identical configurations.

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View All Features

Inference and Consensus

The logic for processing inputs and generating predictions or outputs, along with compilation information. These verification scripts determine how the system aggregates and reaches consensus from results returned from different nodes.

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