# Hekas

## Empowering the Future with a Robust Blockchain Network


## Abstract

Hekas is a cutting-edge blockchain project that aims to revolutionize the crypto industry by providing a high-speed, secure, and cost-effective network for implementing smart contracts, decentralized applications, and asset tokenization. In this paper, we delve into the core features and architecture of the Hekas blockchain, highlighting its unique advantages and the solutions it brings to address the limitations of previous-generation blockchain technologies.


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# 1. Introduction (Problem Statement)

Blockchain technology has revolutionized various industries by offering decentralized and transparent solutions. However, as the adoption of blockchain networks increases, certain limitations become evident. Traditional first-generation blockchains, such as Bitcoin and Ethereum, face challenges related to scalability, transaction speed, and cost-effectiveness. These limitations hinder the widespread adoption of blockchain technology in real-world applications.

The Hekas project addresses these limitations head-on by focusing on speed, security, and cost-effectiveness as key pillars of its blockchain network. By providing a high-performance infrastructure, Hekas aims to enable efficient execution of smart contracts, seamless implementation of decentralized applications (dApps), and tokenization of assets. Through these services, Hekas empowers businesses and individuals to harness the true potential of blockchain technology.

Moreover, Hekas acknowledges the growing demand for a fast, high-processing power, and secure network that can handle a vast number of transactions in real-time. By combining cutting-edge technologies and innovative solutions, Hekas is poised to deliver a blockchain network that not only meets these demands but also exceeds expectations.

# 2. Network Structure

The Hekas blockchain is built on the robust and flexible Cosmos-SDK software development kit. Cosmos-SDK provides a comprehensive framework for creating interoperable, scalable, and customizable blockchains. Leveraging the capabilities of Cosmos-SDK, Hekas ensures that its network architecture is not only efficient and scalable but also highly adaptable to future advancements in the blockchain ecosystem.

## 2-1. Cosmos-SDK

The Cosmos-SDK offers a range of pre-built modules that cater to various functionalities in blockchain development. Here are some key modules and their applications within the framework:

- Auth: The Auth module ensures secure access and transaction validation by handling authentication and authorization. It manages user accounts, signatures, and permissions.

- Bank: With the Bank module, users can send and receive tokens within the blockchain. It supports features such as token issuance, balance management, and transaction processing.
- Staking: The Staking module facilitates token delegation and management. Users can delegate their tokens to validators, participate in the consensus process, and earn rewards based on their stake.
- Distribution: The Distribution module manages reward distribution within the network. It calculates and allocates rewards to validators and delegators, promoting network security and incentivizing participation.
- Governance: The Governance module enables decentralized decision-making. Token holders can propose and vote on network upgrades, parameter changes, and policy decisions, fostering community governance and involvement.
- Slashing: The Slashing module addresses security and consensus violations. It penalizes misbehaving validators by slashing a portion of their staked tokens, serving as a deterrent against malicious actions.
- Vesting: The Vesting module allows for controlled token release over a specified period or based on specific conditions. It offers flexibility in token distribution and incentivization.
- Crisis: The Crisis module handles emergency situations and system-level failures. It provides mechanisms for identifying and resolving critical issues, ensuring network stability and continuity.

A vital component of the Hekas blockchain is the Tendermint consensus algorithm, a proven and secure Proof-of-Stake (PoS) mechanism. Tendermint enables validators to collectively agree on the state of the blockchain, ensuring consensus among participants and preventing any malicious activities. By utilizing Tendermint, Hekas achieves a high degree of security, as well as fast and reliable transaction finality.

## 2-2. Tendermint

The Tendermint consensus algorithm operates through a series of steps to achieve agreement among validators and ensure the security and validity of the blockchain. Here's a breakdown of its functionality:

Validator Set and Block Proposal:

- A predefined set of validators is responsible for proposing and validating blocks.

- Validators are selected based on factors such as token ownership or reputation.
- Validators take turns proposing new blocks that contain batches of transactions.

Round-based Consensus Process:

Tendermint follows a round-based consensus process, consisting of Proposal, Prevote, and Precommit steps.

- Proposal: The current block proposer creates a new block and broadcasts it to the network.
- Prevote: Validators independently evaluate the proposed block's validity and cast a prevote message to signal their vote.
- Precommit: Validators receive prevotes from others, and if a supermajority is reached, they precommit to that block.

Byzantine Fault Tolerance (BFT):

- Tendermint achieves Byzantine Fault Tolerance, tolerating up to one-third of validators being malicious or faulty.
- Validators aim to reach agreement on a specific block by exchanging prevotes and precommits.

Consensus Confirmation:

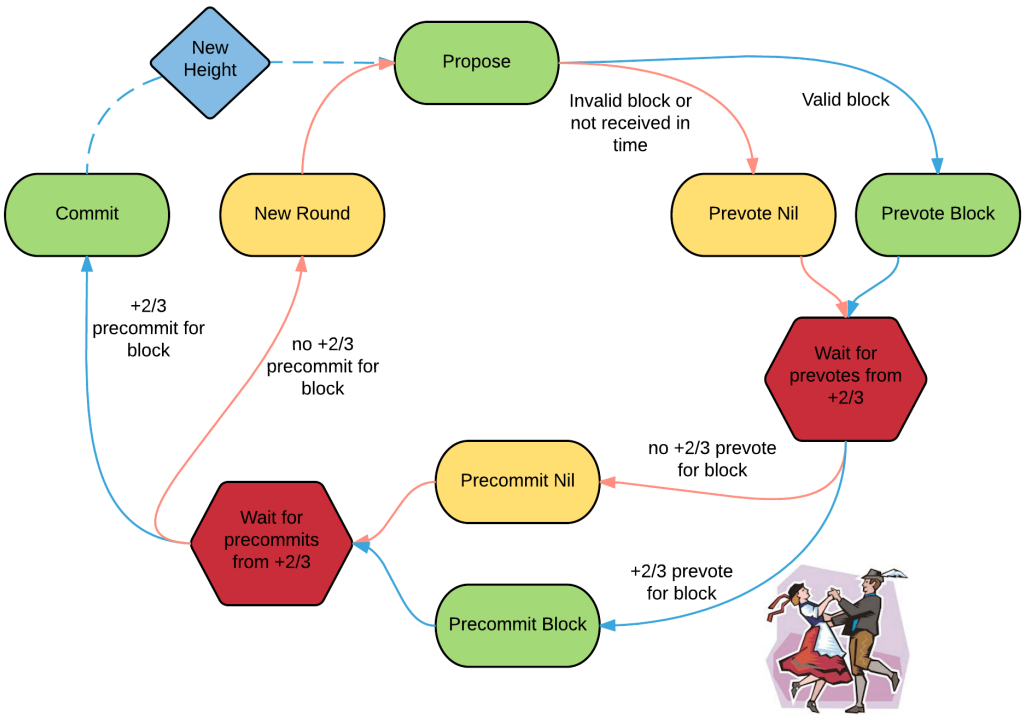
- Once a block is precommitted by the required number of validators, it is considered confirmed and added to the blockchain.
- This confirmation process ensures the immutability and security of the blockchain by preventing forks and ensuring transaction order agreement.

Safety and Liveness:

- Safety: Tendermint ensures safety by requiring two-thirds of validators to agree on block order and validity, preventing conflicting transactions.
- Liveness: Tendermint maintains liveness by continuously proposing and confirming blocks, as long as there are more than one-third honest validators.

Fault Tolerance and Security:

- Tendermint incorporates a robust fault-tolerant design, making it resilient against attacks like Sybil attacks, ensuring network security.
- Validators' proof of token ownership provides a mechanism to prevent malicious behavior.



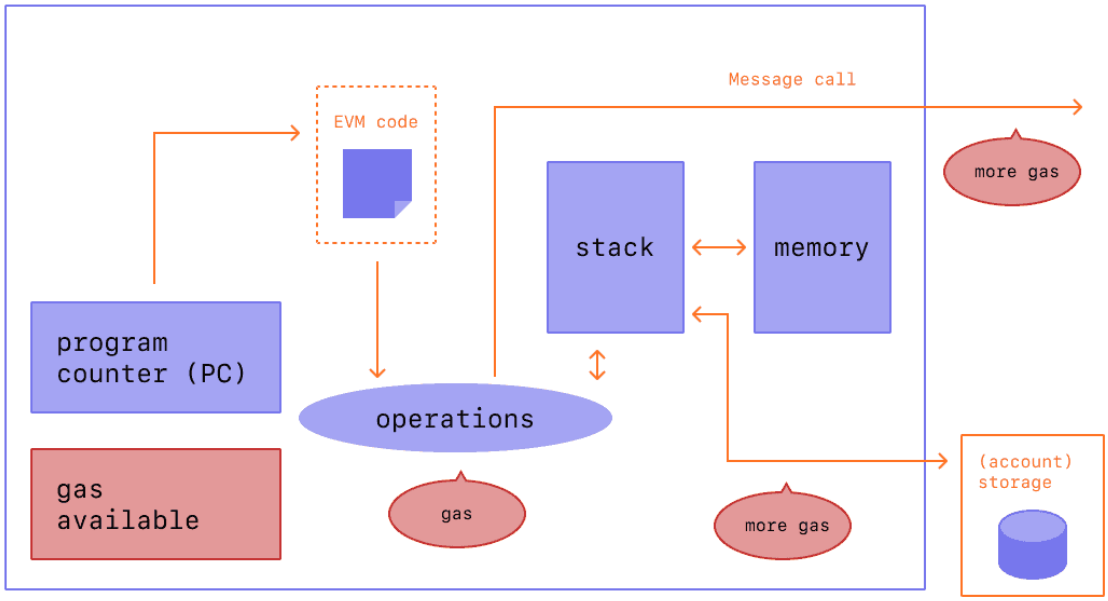

Simple diagram of Tendermint consensus steps from tendermint website.

Through its round-based consensus process, Tendermint enables validators to agree on the order and validity of transactions, ensuring the integrity and reliability of the blockchain network. Its fault-tolerant and secure design further enhances the resilience and trustworthiness of the system.

## 2-3. EVM Compatibility

Hekas stands out by being fully compatible with the Ethereum Virtual Machine (EVM), the runtime environment for executing smart contracts on the Ethereum blockchain. An account-based model blockchain has a special state machine after every block confirmation. In Essence, EVM is the part that defines the rules for computing a new valid state from block to block in the entire blockchain.

This compatibility allows developers to seamlessly port their existing Ethereum-based decentralized applications to the Hekas blockchain, leveraging the familiar Solidity programming language and expanding the network's ecosystem.




Ethereum Virtual Machine diagram from Ethereum website.

With the powerful combination of Cosmos-SDK, the Tendermint consensus algorithm, and EVM compatibility, the Hekas blockchain offers a versatile and robust infrastructure that supports the development and deployment of a wide range of decentralized applications and services.

## 3. Security

The Hekas blockchain places paramount importance on security, ensuring the integrity and protection of its network and user assets. To achieve this, Hekas leverages the robust Tendermint consensus algorithm, which forms the foundation of its secure and reliable operation.

As mentioned before, the Tendermint consensus algorithm is specifically designed to address the challenges of Byzantine fault tolerance in distributed systems. Through a Proof-of-Stake (PoS) mechanism, Tendermint establishes a network of validators responsible for validating and adding new blocks to the blockchain. These validators are carefully selected based on their reputation, expertise, and stake in the network.

Validators participate in a weighted voting process where their voting power is proportional to the amount of stake they hold. This approach ensures that validators with

a larger stake have a greater influence over the consensus process, making the network more resistant to malicious actors.

When it comes to block creation, validators take turns proposing new blocks in a deterministic and fair manner. These proposed blocks are then subjected to a validation process where other validators verify their correctness before they are added to the blockchain. This consensus mechanism guarantees the immutability and security of the Hekas blockchain, making it highly resistant to attacks and tampering.

By employing the Tendermint consensus algorithm, Hekas ensures that the network operates in a secure and decentralized manner, mitigating the risks associated with centralized authorities or single points of failure. The use of Proof-of-Stake provides economic incentives for validators to act honestly and maintain the network's security and stability.

In summary, the security architecture of the Hekas blockchain, driven by the Tendermint consensus algorithm, establishes a robust and trustworthy environment for users to transact and store their assets with confidence.

# 4. Applications

## 4-1. Decentralized Finance (DeFi)

DeFi paves the way for users to participate in a booming crypto economy where they can lend, borrow, long/short, earn interest, and more. DeFi has revolutionized traditional finance by providing automated, secure, and transparent financial services without intermediaries.

Hekas has the potential to empower individuals and businesses by providing financial services to anyone, including the billions of people worldwide who do not have access to a bank account. In Hekas, smart contracts replace financial institutions in transactions. A smart contract is an account that can hold funds and can send/refund them based on predefined conditions.

Hekas enables financial services and products to be accessible to anyone with an internet connection. Hekas provides a trustless environment where the markets are always open, and no central authority can block payments or deny access to any services.

In Hekas, anyone can create and deploy a smart contract without any intermediaries or middlemen. Smart contracts are transparent and public, making them susceptible to

community scrutiny, ensuring their quality. Hekas as a blockchain network, enables smart contracts to be executed automatically and autonomously. Therefore, Hekas provides a trustless and decentralized environment where users can execute financial transactions without any human error or bias.

## 4-2. Non-Fungible tokens (NFTs)

Unlike cryptocurrencies, NFTs represent one-of-a-kind items like art, collectibles, and real estate. Their ownership is securely recorded on the blockchain, making it impossible to modify or replicate them. Through unique IDs and metadata, NFTs maintain their authenticity and value. They are created and managed through smart contracts, following standards such as ERC-721. This decentralized approach ensures transparent ownership and secure transfers.

Artists, creators and collectors can tokenize their work, retain ownership, and sell or license their creations with provable authenticity. Collectors benefit from verifiable ownership and the elimination of counterfeit assets. The blockchain acts as an immutable ledger, recording transaction history and ownership transfers. The growing NFT marketplace facilitates buying, selling, and trading, driven by demand, creator reputation, and token scarcity. NFTs have redefined digital asset exchange, empowering participants to engage in a unique and transparent ecosystem with endless possibilities for the digital economy.

Hekas enables the seamless functionality of NFTs for several reasons:

- Transparent Ownership: The transaction history and token metadata are publicly verifiable. This transparency ensures the integrity of ownership records and eliminates any doubts about the legitimacy of NFTs.
- Immutable Transactions: Once a transaction is confirmed on the Hekas blockchain, it becomes incredibly challenging to manipulate the data and compromise ownership. This robust security feature safeguards the value and uniqueness of NFTs, providing creators and collectors with peace of mind.
- Peer-to-Peer Trading: Hekas facilitates direct peer-to-peer trading of NFTs, eliminating the need for intermediaries that often charge hefty fees. By removing these middlemen, Hekas empowers creators and collectors by enabling efficient and cost-effective transactions, ensuring that the majority of the value remains within the ecosystem.

## 4-3. Decentralized Identity

Decentralized identity revolves around self-controlled, private, and portable identity-related information. Attestations, also known as Verifiable Credentials (like a driver's license which serves as an attestation about an individual's legal right to drive), play a vital role in this concept. They are tamper-proof claims issued by entities, with each attestation associated with a decentralized identifier (DID). These DIDs (such as names, social security numbers, mobile numbers, date and place of birth) are stored on the blockchain, allowing anyone to verify the validity of an attestation by cross-checking the issuer's DID on the ledger. The Hekas blockchain acts as a global directory, enabling the verification of DIDs associated with specific entities.

Unlike identifiers, attestations contain identifiers that reference a specific identity and make claims about attributes associated with that identity. For example, a driver's license contains identifiers like name, date of birth, and address while attesting to the individual's ability to drive legally.

Decentralized identifiers ensure that attestations are self-controlled and verifiable, even if the issuer no longer exists. They provide the holder with proof of the attestation's provenance and validity. Moreover, decentralized identifiers play a crucial role in safeguarding the privacy of personal information. When an individual submits proof of an attestation, the verifying party doesn't need to validate the information itself. Instead, the verifier relies on cryptographic guarantees of the attestation's authenticity and the identity of the issuing organization to determine its validity. Decentralized identity empowers individuals with control over their identity data while enhancing privacy and trust in the digital realm.

## 4-4. Decentralized Social Networks

Decentralized social networks alter the way users interact and share information by leveraging blockchain technology. They are actually kind of DApps, running on the blockchain, offer a decentralized and censorship-resistant environment for exchanging information and distributing content to a global audience. Unlike traditional social media platforms that rely on centralized databases, decentralized social networks operate on a peer-to-peer network of nodes spread across the globe. This distributed architecture ensures that even if some nodes fail, the network remains operational, eliminating single points of failure and making the platform resilient to outages.

By utilizing decentralized storage systems like the Inter-Planetary File System (IPFS), social networks built on Hekas provide enhanced data protection. User information is safeguarded against exploitation and malicious use, as personal data cannot be sold to advertisers, nor can hackers easily access confidential details. The decentralized nature of these networks ensures greater privacy and security for users.

Moreover, many blockchain-based social platforms introduce native tokens that power their monetization models in the absence of traditional advertising revenue. These tokens enable users to access specific features, make in-app purchases, or tip their favorite content creators. This token economy empowers users and content creators, fostering a vibrant ecosystem where participants are rewarded for their contributions and engagement.

## 4-5. Decentralized Autonomous Organizations (DAOs)

DAOs have completely changed the structure of traditional organizations, particularly in contexts involving funding and financial transactions. Trust plays a crucial role when collaborating with others, especially when it comes to monetary matters. However, relying solely on trust can be challenging, particularly when interacting with individuals solely through online platforms. DAOs address this issue by eliminating the need to trust individuals directly and instead placing trust in the DAO's transparent and verifiable code.

DAOs allow like-minded individuals from around the world to collaborate without having to place trust in a centralized authority to manage funds or oversee operations. Gone are the days of relying on a CEO or CFO who may have discretionary control over resources or the ability to manipulate financial records.

Instead, DAOs operate based on predefined rules and conditions embedded within the code, ensuring transparency, accountability, and fairness. These organizations are equipped with built-in treasuries, which can only be accessed with the approval of the collective group. Decision-making within DAOs follows a democratic process, where proposals are put forward and voted upon, giving every participant a voice in shaping the organization's direction. The entire operation of a DAO occurs transparently on the blockchain, providing a secure and auditable environment for all stakeholders.

### 4-6. Hosting Stablecoins

Stablecoins are a type of cryptocurrency that are designed to maintain a stable value by pegging them to a specific asset or a basket of assets. Unlike other cryptocurrencies, which can be highly volatile, stablecoins offer stability and serve as a reliable medium of exchange and store of value. They provide the benefits of cryptocurrencies, such as fast and secure transactions, while minimizing the price fluctuations typically associated with digital assets.

## 5. Tokenomics (Token Economics)

### 5-1. HEKAS Coin

The native cryptocurrency of the Hekas blockchain is called HEKAS, represented in uppercase letters. HEKAS serves as a utility token with multiple functionalities within the network. Firstly, it facilitates seamless transfer of funds between network addresses, providing a fast and secure medium of exchange. Secondly, HEKAS coins are used to pay transaction fees and execute smart contracts, ensuring the smooth functioning of the network. Additionally, users can stake their HEKAS, participating in the consensus process and receiving rewards for securing the network. Finally, HEKAS holders actively engage in governance voting, influencing the decision-making process regarding proposed changes to the network. This participatory approach ensures a decentralized and community-driven ecosystem.

### 5-2. Supply & Inflation Rate

The rarity of utility coins plays a crucial role in the dynamics of a blockchain ecosystem. It creates a sense of scarcity and value, driving demand and ensuring a thriving economy within the network. Hekas recognizes the significance of rarity and has designed its token economy to reflect this understanding. Having a small number of coins on the network, unlike other blockchains that issue billions of coins, Hekas aims to enhance the perceived value and utility of its native coin, HEKAS.

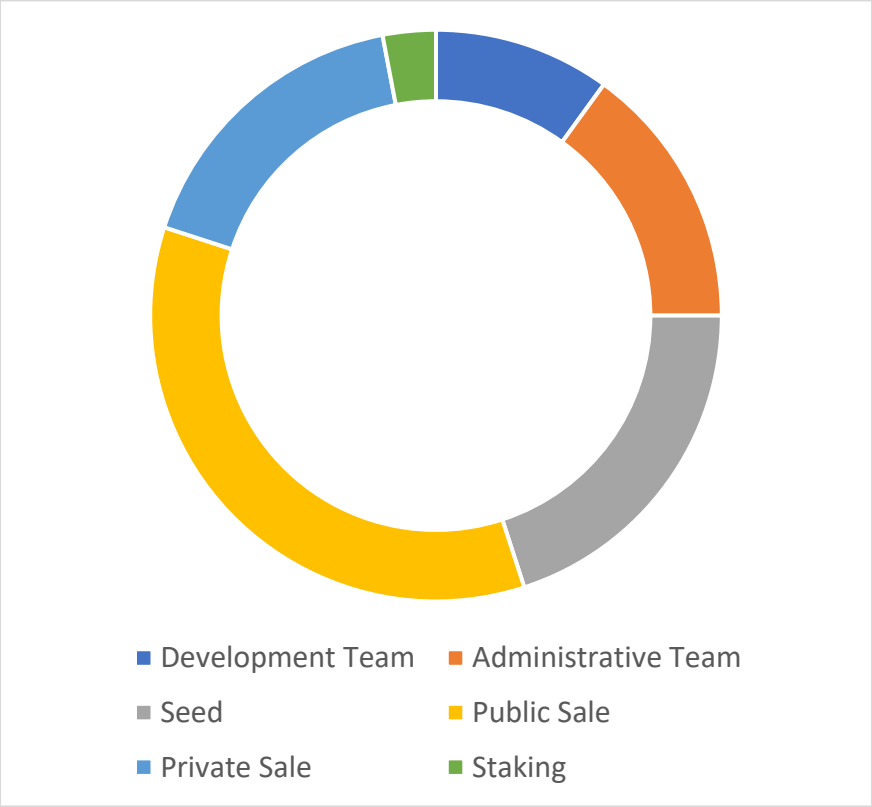
The initial supply of HEKAS coins is 28 million, which were pre-minted to support the network's launch. To incentivize active participation and ensure network security, an annual inflation rate ranging from 8% to 20% is implemented, inspired by the ATOM coin supply mechanism in the Cosmos Hub ecosystem. If at least two-thirds of the total coins are staked, the inflation rate remains at 8%. However, if the staked coins fall

below this threshold, the inflation rate gradually increases to 20%. This mechanism motivates users to stake their coins, enhancing network security and stability.

## 5-3. Distribution

One noticeable point about Hekas project is that there was no crowdfunding or ICO and all costs were paid by its creators. However, the largest number of HEKAS coins will be publicly distributed among users. Token distribution is as follows:

Development Team: 10 %
Administrative Team 15 %
Seed: 20 %
Public Sale: 35 %
Private Sale: 17 %
Staking: 3 %



## 6. Offline Staking

Hekas recognizes the importance of providing flexible options for users to participate in the network and earn rewards. To cater to the needs of long-term holders and Hekas supporters, the platform introduces the groundbreaking concept of offline staking.

Offline staking allows users to keep their cryptocurrencies securely stored in an offline wallet while still earning staking rewards. With this feature, users can delegate their wallet addresses to validators without transferring their coins, ensuring that their assets remain under their control at all times. By delegating, users actively contribute to the network's security and consensus process, all while maintaining control over their funds.

This mechanism empowers Hekas supporters to increase their assets passively, even if they do not possess the technical expertise or resources to run a validator node. Additionally, it offers a convenient solution for those who prefer to keep their coins securely stored offline while benefiting from the staking rewards.

Offline staking on the Hekas blockchain provides a win-win situation, fostering a more inclusive and diverse network by allowing a broader range of participants to engage actively in securing and validating transactions.

## 7. Technical Characteristics summary

- Transaction model: Account-Based Model
- Smart contract architecture: EVM
- Average block spacing: 4 seconds
- Smart contract token protocol: ERC20, ERC721, ERC1155
- Consensus algorithm: Tendermint (PoS)
- Theoretical maximum TPS (Transactions Per Second): 10000 tx/s
- Pre-Minted coins: 28,000,000 HEKAS
- Maximum supply: No max supply with annual inflation rate: 8% to 20%

## 8. Roadmap

**Dec 2023:**

- Running Hekas Mainnet
- Generating pre-minted coins

- Establishing Hekas blockchain explorer

**Jan 2024:**

- Running Lotus Wallet (A multi-chain, non-custodial crypto wallet with built-in exchange for cross-chain swap trading)

**Feb 2024:**

- Offline Staking feature

**April 2024:**

- Initiating Lotus Tokenization Platform

**Dec 2024:**

- Lotus NFT Marketplace platform

## 9. Founder

Hekas blockchain was made to order by IDERO Decentralized Data, which is a prominent technology development company in Iran. It has been two decades since the existence of this company, and in a way, it can be said that the Hekas blockchain and decentralized financial services that will be built on this platform are considered to be one of the most valuable services of this company to the middle-east crypto society.

## 10. References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