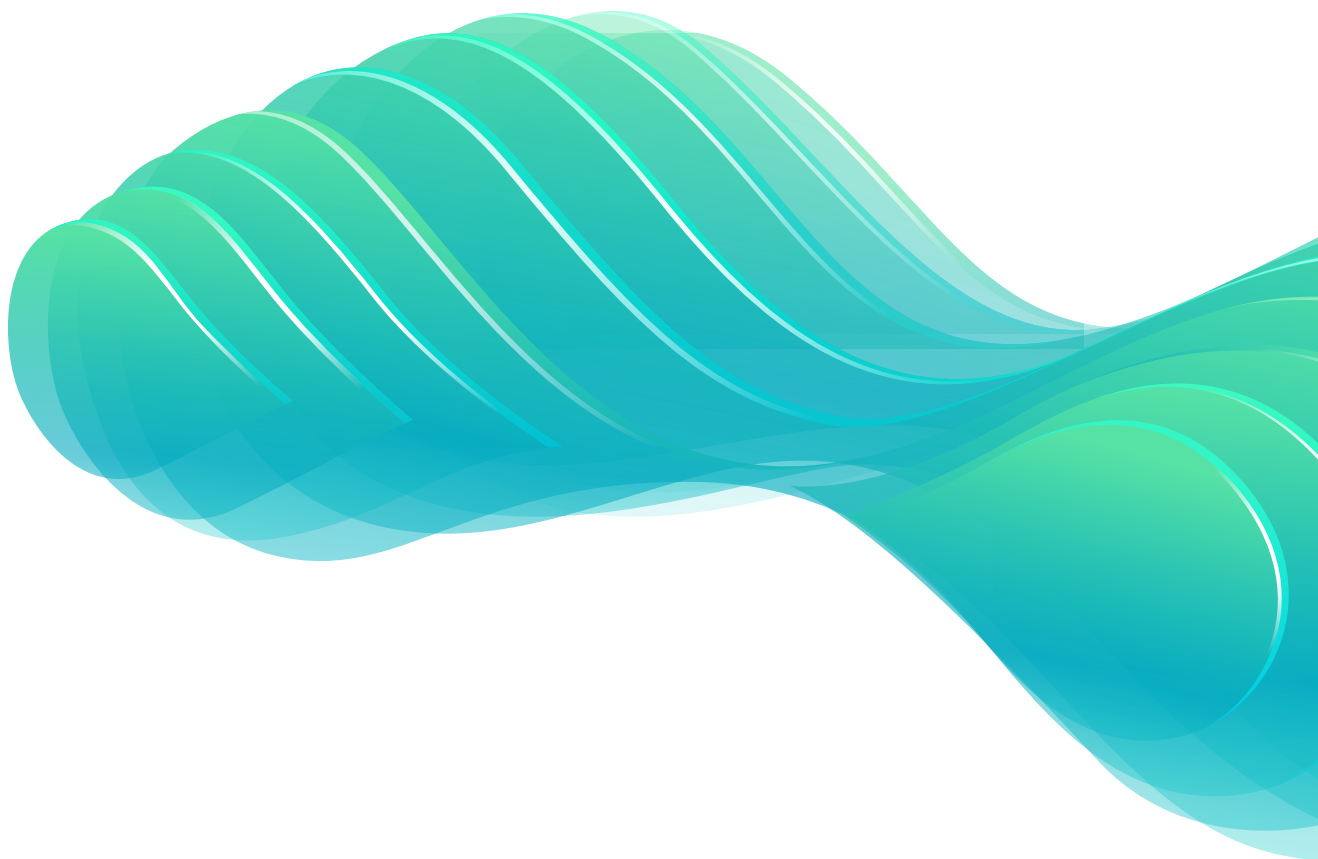


# HelaChain

Built for [All](#). Perfect for [Web3 Adoption](#).

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## Introduction

# Preface

Blockchain technology has rapidly evolved in recent years. Its decentralized, transparent, and immutable nature has led people to foresee its widespread integration across various industries, thus inspiring leading technologists and innovators to contribute their ideas. This has led to the development of diverse blockchain protocols, ecosystems and applications.

As blockchain technology continues to advance, new opportunities and challenges arise. In response, many blockchain protocols and ecosystems have put forth significant effort into overcoming the limitations of existing blockchain solutions such as scalability, interoperability, privacy, and user experience. Despite the progress we've achieved, mass adoption still seems out of reach.

This is where we come in. Years of extensive research coupled with an exceptional research team has led us to a solution : Hela, a next-generation layer 1 blockchain protocol with the mission to bringing Web3 to the real world. To achieve this, we leverage innovative features such as the use of stablecoins as gas fees, providing users with data sovereignty and the privacy through advanced cryptographic techniques such as zero-knowledge proofs and homomorphic encryption. These features are built upon a modular architecture that balances security, scalability, and decentralization.

Hela's technologies are poised to revolutionize a wide range of industries. Beyond the current applications within finance and healthcare, we wish to bring greater value alternative sectors within gaming, agriculture and government services where concerns with regards to data sovereignty, security and efficient transactions are paramount.

At Hela, we believe that our comprehensive solution can empower individuals, facilitate global collaboration and promote innovation in ways that were previously impossible.

# The Rationale **Behind Hela**

When users deal with Web2 companies in the current digital landscape, they often agree to various terms and conditions after skimming through it for the sake of convenience. This has resulted in a significant number of users relinquishing control of their personal data to centralized entities, posing significant risks to user privacy and security.

As data becomes an increasingly valuable commodity, surrendering control of your personal information is highly undesirable. The existing paradigm necessitates trust in these centralized companies to manage and protect user data responsibly, yet instances of data loss, leakage and misuse persist.

The emergence of blockchain technology offers a solution by empowering individuals to reclaim their digital sovereignty. Harnessing the open, transparent and decentralized nature of blockchain systems, users can exert autonomy over their data, access open resources across borders, and facilitate resource sharing without reliance on centralized intermediaries.

Despite the advancements in blockchain technology, significant real-world adoption remains elusive due to persistent technical challenges within the ecosystem:

- **Suboptimal user experience:** Current blockchain protocols often require the acquisition of protocol-specific tokens to access features and pay transaction fees. This practice complicates token management and introduces risks, while also resulting in unstable and costly transaction fees due to the volatile nature of token prices.
- **Insufficient confidentiality mechanisms:** A majority of existing blockchain protocols fail to provide adequate privacy protection for user data, hindering widespread blockchain adoption. Conversely, some protocols enforce confidentiality for all data, undermining user autonomy over their information.

- **Inadequate identity management:** The inherent anonymity of user identities within blockchains poses challenges for effective identity management in many protocols. This deficiency compromises the legitimacy and auditability of contemporary blockchains, impeding their integration with real-world use cases.
  - **Limited interoperability:** The development of modular blockchains, the proliferation of Layer 2 protocols, and the proposal of diverse blockchain systems have introduced valuable features such as scalability, flexibility and customizability. However, these advancements have also given rise to issues such as asset fragmentation, data isolation between chains and lack of interoperability. This ultimately compromises security, efficiency and user experience.
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## Overview

# Introducing **Hela**

Hela represents the next generation of Layer 1 blockchain protocols, built upon the principles of Web 3.0. Designed with a user-centric approach, Hela empowers users by providing enhanced asset integration, flexible personal sovereignty, and an exceptional user experience, while ensuring auditability and compliance of their data.

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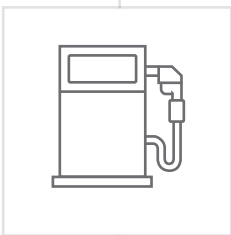
## Overview

# Technology Solution



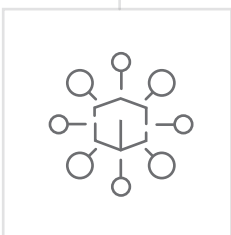
### Asset Integrity

Leveraging Hela's innovative asset integration layer, the protocol facilitates the seamless integration of various assets across runtimes in a modular blockchain environment, providing users with an unparalleled interoperability experience.



### Stablecoin as Gas Fee

Committed to delivering an optimal user experience, Hela offers users stable, low transaction fees by leveraging a stablecoin as the native gas fee, mitigating the impact of price volatility on network operations.



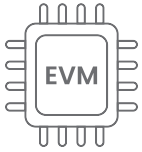
### Decentralized Identity (DID)

Hela's advanced, decentralized identity management system enables fine-grained individual sovereignty and auditability across the network, fostering trust and legitimacy within the ecosystem.



### Confidentiality

Hela employs cutting-edge privacy protection technologies, empowering users with the ability to safeguard their data at varying levels of granularity while preserving transparency and compliance.



## EVM Compatibility

Hela ensures seamless Ethereum Virtual Machine (EVM) compatibility, enabling users and developers to effortlessly integrate and migrate applications within the Hela ecosystem.



## Modularity

By decoupling the system into consensus, execution, asset integration, and storage layers, Hela delivers unparalleled customizability, extensibility, and upgradability, fostering a dynamic and adaptable blockchain infrastructure.



## Scalability

Harnessing a scalable consensus protocol and a modular architecture, Hela supports scalable throughput and rapid transaction finality to accommodate the growing demands of a diverse user base.



## Security

Through a secure consensus protocol and the engagement of professional validators, Hela ensures robust security measures for both the protocol and the entire ecosystem, mitigating potential vulnerabilities and threats.



## Framework

# Hela Chain

Hela is designed with a user-centered approach. Drawing inspiration from well-established projects like Tendermint, Cosmos, and Oasis as implementation references, Hela differentiates itself through unique and customized designs. These include a multi-layer modular architecture with a novel asset integration layer, autonomous and controlled multi-level privacy protection, comprehensive and fine-grained digital identity management, as well as stable and affordable transaction fees.

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## R&D Partner

# Hela Labs Partners with IHPC



- **Hela Labs** has partnered with **A\*STAR's Institute of High Performance Computing** to co-develop Hela Chain.
- **The collaboration** combines Hela Labs' innovative approach with A\*STAR's talented scientists and engineers, which is committed to bringing cutting-edge technology to Singapore and beyond.
- **Our shared goal** is to create a blockchain protocol that can handle a high volume of transactions while maintaining security and decentralization. Together, we share the same vision of bringing blockchain technology to the real world and making it accessible to everyone.

## Key Features

# Key Features of Hela Chain

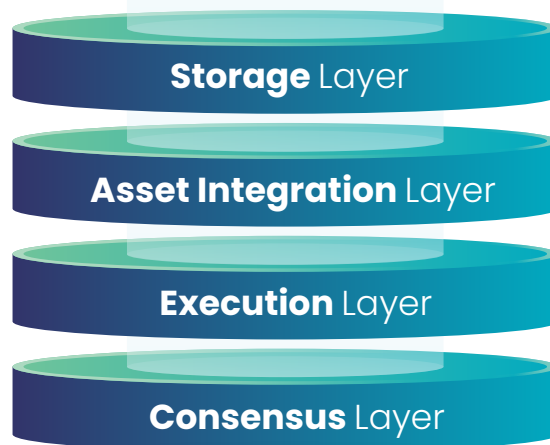
- Hela Chain's **modular design** includes an innovative **asset integration** layer that facilitates the seamless integration of assets across runtimes in a modular blockchain environment. This is in addition to an execution, a consensus and a storage layer that makes the chain highly flexible and scalable.
- The chain has a built-in stable coin token that serves as the gas fee for transactions, **reducing volatility** and increasing user adoption.
- Hela Chain also features a **multi-level decentralized identity** for enhanced security and privacy-preserving transactions for added confidentiality.

# Competitive Landscape

	Hela	Ethereum 2.0	Solana	Sui	Aptos
<b>Programming Language</b>	Go, Rust	Go, C++, Rust	Rust	Move, Rust	Move, Rust
<b>Consensus</b>	Tendermint Core	Proof of Stake (POS)	Proof of History (POH)	Narwhal, Bullshark	Delegated Proof of Stake (DPoS) AptosBFT
<b>Modularity</b>	✓	✓	✗	✗	✓
<b>EVM Compatibility</b>	✓	✓	✓	✗	✗
<b>Transaction Fee Stability</b>	Very Stable (Stablecoin Gas Fees)	Fluctuate	Fluctuate	Fluctuate	Fluctuate
<b>Native Decentralized Digital Identity</b>	✓ (Multi-Level Management)	✗	✗	✗	✗
<b>Built-in Confidentiality</b>	✓ (Flexibility, Auditability)	✗	✗	✗	✗
<b>Asset Integration Layer</b>	✓	✗	✗	✗	✗
<b>On-Chain Stablecoin Governance</b>	✓	✗	✗	✗	✗

## Modular Blockchain Architecture

Consensus  
**Execution**  
Asset Integration  
**Storage**



Hela is an innovative, modular blockchain that dissects the system into distinct, interconnected layers: the consensus layer, the execution layer, the asset integration layer and the storage layer.

In the Hela framework, each layer is managed independently by specialized roles. These layers collaborate with one another, collectively delivering security, scalability, decentralization and other crucial properties to the Hela ecosystem, ultimately empowering users with a next-generation blockchain experience.

## Consensus Layer

# Hela Nucleus

The consensus layer of Hela serves as the core of the entire system, akin to the nucleus of Hela. It adopts the Tendermint as the consensus protocol, which is based on Byzantine-Fault-Tolerant (BFT) and Proof-of-Stake (PoS).

For security reasons, HELA permits qualified entities (e.g., those that have successfully completed KYC) to vie for a position as consensus nodes in the consensus committee by staking HELA tokens. To promote decentralization, other individuals can also indirectly engage in the consensus process by delegating tokens to existing nodes.

To incentivize honest participation from consensus nodes and ensure the security and sustainability of the Hela ecosystem, nodes are rewarded or penalized with Hela tokens based on their behavior. The effectiveness of such an incentive mechanism relies on a rigorous proof of soundness. Leveraging our expertise in security and economics, we have meticulously designed and analyzed our incentive mechanism to ensure its robustness and efficacy.

Capitalizing on its modular architecture, Hela separates resource-intensive transaction execution from the consensus layer. As a result, the consensus layer is tasked with lightweight operations such as transaction validation, node management and stake allocation. This streamlined approach enables Hela to achieve remarkably high transactions per second (TPS) and near-instant transaction finality, offering users a highly efficient and responsive blockchain experience.

## Execution Layer

# Hela Organelles

The execution layer of Hela can be compared to the organelles within the Hela structure. To meet the need for customizability, developers can easily deploy runtimes that cater to specific application scenarios and business requirements in Hela's execution layer using our Hela SDK.

Owing to Hela's modular design, the nodes within the execution layer are responsible for the specific execution of transactions. The execution layer incorporates the concept of rollups to enhance system performance, while transaction finality is ensured by the consensus layer for security purposes.

For the purpose of decentralization, in Hela's official runtime, anyone can compete to become a runtime node by staking Hela tokens.

Moreover, in Hela's official runtime, transaction fees are settled using our stablecoin (further details provided later). Runtime nodes are entitled to receive not only Hela tokens but also these transaction fees as additional rewards. This incentivizes honest behavior and promotes the secure, sustainable development of the Hela ecosystem.

By allowing developers to create custom runtimes using the Hela SDK, the execution layer fosters a diverse and vibrant development community. With the support of a robust and flexible infrastructure, Hela enables the creation of innovative, decentralized applications that cater to a wide range of use cases, driving the adoption of blockchain technology and the growth of the Hela ecosystem.

## Asset Integration Layer

# All Assets, ONE Layer

The asset integration layer is the most innovative design in the entire Hela modular architecture. It is designed to address the growing problem of data and asset fragmentation, as well as poor interoperability in the current blockchain space.

By aggregating state across runtimes in this layer, users can seamlessly leverage their arbitrary assets (e.g., balances, DIDs) in any runtime to interact securely and swiftly with arbitrary business logic (e.g., liquidity, NFTs) in any runtime.

The asset integration layer is maintained by a set of integration layer nodes. In the interest of decentralization, any node can compete to become a node in the asset integration layer by staking a certain amount of Hela.

These nodes continuously integrate the state in each runtime and use the integrated assets to interact with the corresponding runtimes when users have a need.

For security reasons, the asset integration layer enjoys the same level of finality as the consensus layer. More importantly, with our innovative cross-layer intelligent transaction processing mechanism, users enjoy an unparalleled user experience while transactions are executed efficiently and atomically across runtimes.

Hela will continue to work on solving the problem of data silos and poor interoperability in the blockchain space. Hela will expand the application scenario from cross-runtime to cross-Layer 2 and even cross-chain, fostering seamless interaction and collaboration across various blockchain networks and platforms.



## Storage Layer

# Hela Cytoplasm

Analogous to the cytoplasm within Hela, the storage layer's primary responsibility is to ensure data availability throughout the blockchain.

Within the storage layer, individuals can opt to store all or part of the blockchain data, depending on their storage capacity, and become data availability providers for Hela. By participating in data availability verification, they can offer data availability support to the HELA ecosystem and receive token rewards.

The integration of the storage layer further reinforces the decentralized nature of Hela.

Additionally, by separating the storage layer from the execution and consensus layers, the load on execution and consensus nodes is reduced, contributing to enhanced scalability for Hela.

This layered approach to data management ensures efficient and secure data storage, accommodating the growing demands of a diverse user base. By encouraging participation in the storage layer, Hela fosters a robust and resilient infrastructure capable of supporting a wide range of applications and use cases, driving the adoption of blockchain technology and the growth of the Hela ecosystem.

## Data Management

# Privacy and Sovereignty

Hela places the utmost importance on preserving users' data privacy. It adopts and aims to continuously develop cutting-edge privacy technologies, such as zero-knowledge proofs and trusted execution environments, to provide robust data privacy safeguards for users.

Unlike previous blockchain protocols that rendered users' data either entirely transparent or fully confidential, Hela grants users complete autonomy over their data. Users can determine, at a granular level, whether to authorize certain data for use by others, specifying who can access it and how it can be utilized. Additionally, users can employ zero-knowledge proof technology to access services requiring data validation without revealing their data.

By offering users the ability to exercise fine-grained control over their data, Hela empowers individuals to take charge of their digital sovereignty. The platform's commitment to data privacy and user autonomy facilitates trust and confidence, attracting a wider audience to the Hela ecosystem and enabling the development of innovative applications that prioritize user privacy and data protection.

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## Identity Management

# Decentralized Identity Management

Hela incorporates a native decentralized identity (DID) management system for managing users' digital identities.

In Hela, users can generate and verify various digital identifiers in multiple ways. These identifiers collectively form a user's digital identity, over which they maintain full and granular control. DApp developers can also customize requirements for different digital identifiers within their applications.

Through robust DID management, Hela enhances auditability and compliance. More importantly, the native DID management system broadens Hela's applicability across a range of application scenarios, such as credit lending, online ticketing, and other KYC-requiring applications, which were challenging to implement in previous blockchain protocols.

Hela's DID management system also equips DApp developers with tools for creating more trustworthy applications, particularly in the financial sector. By fostering a secure and transparent digital identity framework, Hela paves the way for enhanced trust and collaboration between users, developers and enterprises, driving the adoption of blockchain technology across various industries and use cases.

## Transaction Fees

# Stable and Low Transaction Fees

Hela guarantees users stable and low transaction fees. To achieve this objective, Hela draws inspiration from real-world online trading use cases, uniquely proposing the use of a stablecoin for transaction fee settlement.

In Hela, users need not purchase Hela tokens for fee settlement; transaction fees are settled using our stablecoin. Hela tokens serve more specific purposes, such as staking, rewards and penalties, and community governance.

To further enhance user experience and simplify understanding and operation, users can opt to pay transaction fees in any currency, with fee always settled via stablecoin within the system.

As a result, Hela ensures absolute stability of transaction fees, avoiding increased fees due to rising coin prices. This design lowers the barrier for users transitioning from Web 2.0 to Web 3.0 and eliminates the financial risk associated with holding multiple tokens. By providing a user-friendly and cost-effective transaction fee model, Hela encourages wider adoption of blockchain technology and fosters a more accessible and inclusive ecosystem for all participants.

## Tokenomics

# Designing Theoretically Sound Token Mechanisms

Many existing blockchains lack rigorously sound tokenomics, meaning that their designs, such as coin minting processes or reward allocations to nodes, were determined without careful consideration of the effects on human behavior.

Tokenomics must be objective-driven; it is crucial to first establish the ideal situation, such as ensuring robustness against potential attacks, and then design tokenomics to achieve that goal.

Our primary objective for Hela's tokenomics is to ensure that all key nodes function as intended and that Hela remains secure against any malicious activities.

To achieve this objective, we allocate an adequate amount of tokens as incentives for node operation.

One of the novelties in our design is the consideration of actual operational costs to ensure fair token rewards for different node operations. We also introduce staking and punishment mechanisms to deter malicious entities from attacking Hela, assessing their impact on the network's security.

Hela fully leverages the team's expertise in economics, psychology, and computer science to design and analyze its tokenomics. By implementing a comprehensive and theoretically sound tokenomics system, Hela fosters a secure, sustainable, and equitable ecosystem, ensuring that participants are appropriately incentivized and the network remains resilient against potential threats. This well-designed tokenomics model further bolsters Hela's position as a leading Layer 1 blockchain protocol, primed for widespread adoption and long-term success.

# Conclusion and Outlook

In conclusion, the Hela project pioneers a new paradigm in Layer 1 blockchain technology, addressing the critical challenges faced by the industry and empowering users to regain control over their digital lives. By leveraging a modular architecture, state-of-the-art privacy technologies, a robust decentralized identity management system, and innovative transaction fees and tokenomics, Hela sets the stage for a more secure, scalable and interoperable blockchain ecosystem.

Looking ahead, Hela's commitment to continuous development and innovation will drive the evolution of the project, with a focus on enhancing cross-chain and cross-Layer 2 functionality, refining privacy and identity management features, and optimizing transaction fees and tokenomics. As we progress, the Hela team will actively engage with the community, developers, and stakeholders to ensure the platform remains aligned with user needs and industry demands. Ultimately, we envision Hela becoming a driving force in the blockchain landscape, catalyzing the widespread adoption of decentralized technologies and fostering the growth of a truly decentralized and interconnected digital world.

## Contributors

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# Core Builders

## Dr. Andy Ting

**Co-founder**, Hela labs. He received Ph.D. degree from the Nanyang Technological University of Singapore. He leads a team of more than 12 scientists and engineers. He is the author or co-author of 8 peer-reviewed papers in prestigious journals and conferences. His research interest includes Blockchain, FinTech, AI, Real time simulation Computing.

## Kerching Choo

**Co-founder**, Hela Labs. He is a highly skilled engineer with extensive experience in software and game development. He leads the technical design and development team in diverse projects for different companies over 15 years. He also has a keen interest in researching games development, FinTech, Blockchain and AI.

## Core Builders (Scientists)

**Principal Scientist**, Institute of High Performance Computing (IHPC), A\*STAR, Singapore. He received Ph.D. degree from the National University of Singapore. He leads a team of more than 80 scientists and engineers. He is the author or co-author of more than 140 peer-reviewed papers in prestigious journals and conferences. His research interest includes Blockchain, Web3, FinTech, AI, Deep Learning, High Performance Computing and Decentralised Computing.

**Senior Scientist**, Institute of High Performance Computing, A\*STAR, Singapore. He published more than 80 peer-reviewed papers in prestigious journals and conferences, organised several international scientific conferences and has several patents granted. He is leading a team developing new techniques for efficient and privacy-preserving Blockchain system. He is a senior member of the IEEE. He received Ph.D. from the University of Electronic Science and Technology of China (UESTC). His research interests include Blockchain, decentralized computing, privacy-preserving federated learning, multi-party computing, high performance computing, In-memory computing.

**Scientist**, Institute of High Performance Computing (IHPC), A\*STAR, Singapore, and a Champion of its blockchain group. Highly skilled and experienced blockchain expert with a strong academic background in Blockchain and distributed system. He received Ph.D. degree from Hong Kong University of Science and Technology. He published several high quality papers in top conference and journals such as ICDCS, INFOCOM, TPDS, Internet of Thing Journal. His interests are mainly in scalable and secure blockchain protocols, Web 3.0, privacy-preserving blockchain, network economics.



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**Scientist**, Institute of High Performance Computing (IHPC), A\*STAR, Singapore. He holds a Ph.D. from the Singapore University of Technology and Design (SUTD). Highly skilled and experienced blockchain expert with a strong academic background in smart contracts analysis. His research interests include formal methods, symbolic execution, blockchain and smart contracts. He has worked on various projects, including the correctness of smart contracts with the methods of static analysis, formal verification and learning techniques, the reduction of gas consumption for smart contracts without compromising functionality and security etc.

**Scientist**, Institute of High Performance Computing (IHPC), A\*STAR, Singapore. He received Ph.D. (Engineering) degrees from Keio University, Japan. He was an assistant professor at Keio University from Apr. 2016 to Mar. 2019. His research interests include blockchain, incentive mechanism design, and decentralized identity.

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## Core Builders (Engineers)

**Principal Engineer,** Institute of High Performance Computing, A\*STAR. Highly skilled engineer with various experience in cloud computing, software development and machine learning area in past years. He led the project development in Blockchain, Medical, Network, Industry IoT, Genetics Imputation. His research interest includes Blockchain development, distributed system, and system security.

**Principal Engineer,** Institute of High Performance Computing, A\*STAR. He leads the design of innovation solution through working with industry partners. Highly skilled engineer with various experience in software development and machine learning. His research interest includes distributed system, high performance computing, Blockchain, software development.

**Senior Engineer,** Institute of High Performance Computing, A\*STAR. Highly skilled blockchain engineer with various experience in blockchain project development including Blockchain-based governance, Blockchain for secure data sharing, etc. His research interests include Blockchain, IoT, and Federated Learning, distributed computing system. He is familiar Hyperledger Fabric and Cosmos framework. He was working on different domains including Windows/Linux Device Drivers, UI/UX with QT, Web Application backend and Distributed System. His preferred programming languages include C/C++, Java, JavaScript, Python.

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**Senior Engineer,** Institute of High Performance Computing, A\*STAR. He has been actively involved and passionate about the fields of blockchain and AI for years, having worked as a solution engineer and led research and development teams at NEC Corp and Alibaba Group from 2018 to 2020. His research interests include blockchain, high-performance computing, distributed storage systems and AI. He is dedicated to advancing the development of the latest technologies and believes that the intersection of AI and blockchain has the potential to transform industries and improve people's lives. He is excited to be at the forefront of this research.

**Senior Engineer,** Institute of High Performance Computing, A\*STAR, Singapore. He has experience in various projects including Blockchain, federated learning, HPC, IoT, edge computing, cloud infrastructure and object-detection using deep-learning. His interests include Blockchain development, tokens, smart contract development, wallets, and Blockchain applications.

# Connect and Make a Difference

If you have any further questions or would like to learn more about Hela Chain, please kindly contact us.



## Official website

<https://helalabs.com/>



## Email

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## Twitter

[https://twitter.com/Hela\\_Network](https://twitter.com/Hela_Network)