Intro Workshop:

Hedera 101

Ed Marquez

Head of Developer Relations
Hashgraph

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Head of Developer Relations at Hashgraph

Let’s Connect!

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Mechanical Engineer

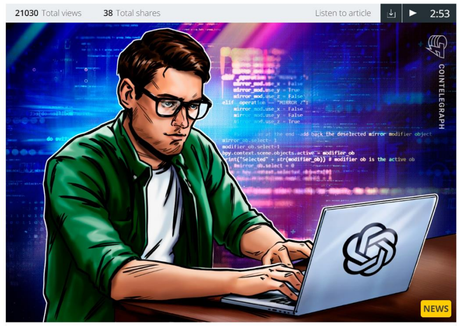
MATLAB

Engineering Software

Passionate about Web 3

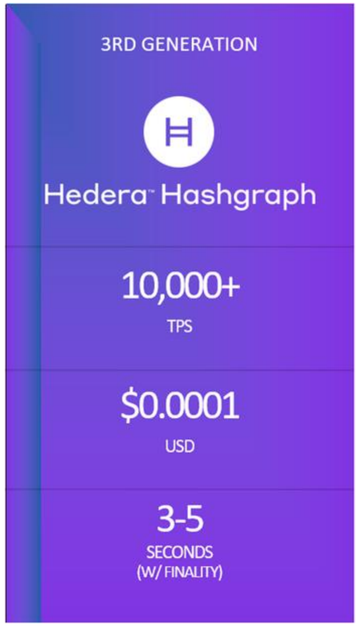
ChatGPT plugin goes live for Hedera network

Users can view account balances through a network explorer or programmatically retrieve them via the mirror node Rest API, which the plugin will utilize.

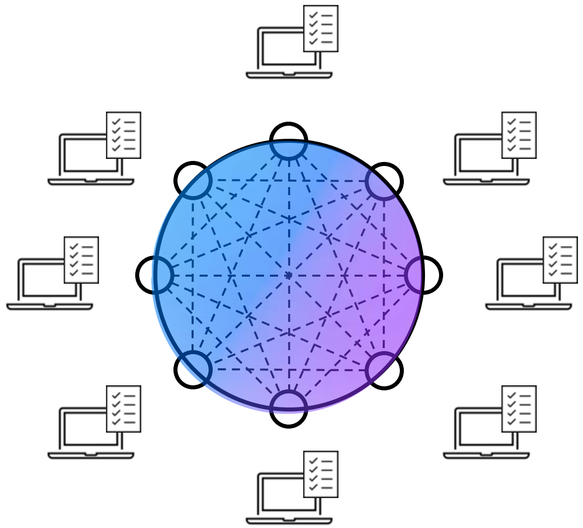


Blockchain & Tech

In this session, you will learn how the **Hedera network functions**, how you can **start development**, and **where to learn more**



Introduction



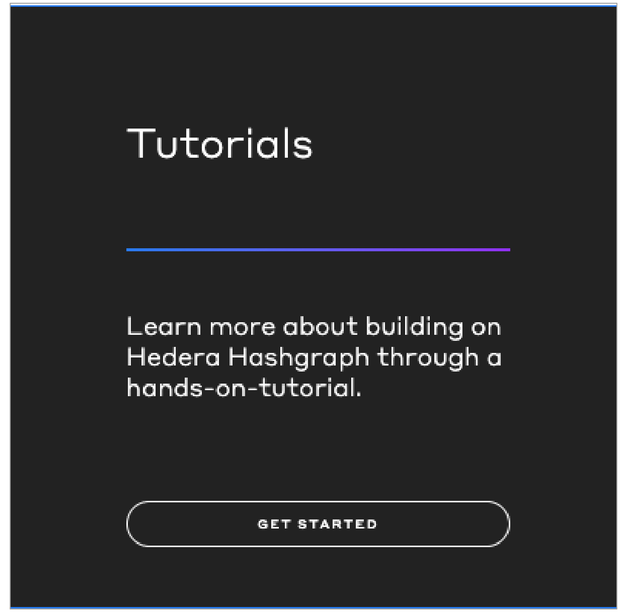
Understand
the Hedera Network

CONSENSUS SERVICE

TOKEN SERVICE

SMART CONTRACTS

Start Developing on
Hedera



Get Resources and
Learn More

The web evolves continuously and now it is becoming more decentralized

Pre-1970

Analog Era

Paper documentation

1970

Digital Era

Mainframes & computers

- Speed

2000

Internet Era

Interconnected computers

- Speed
- Access & collaboration

2009

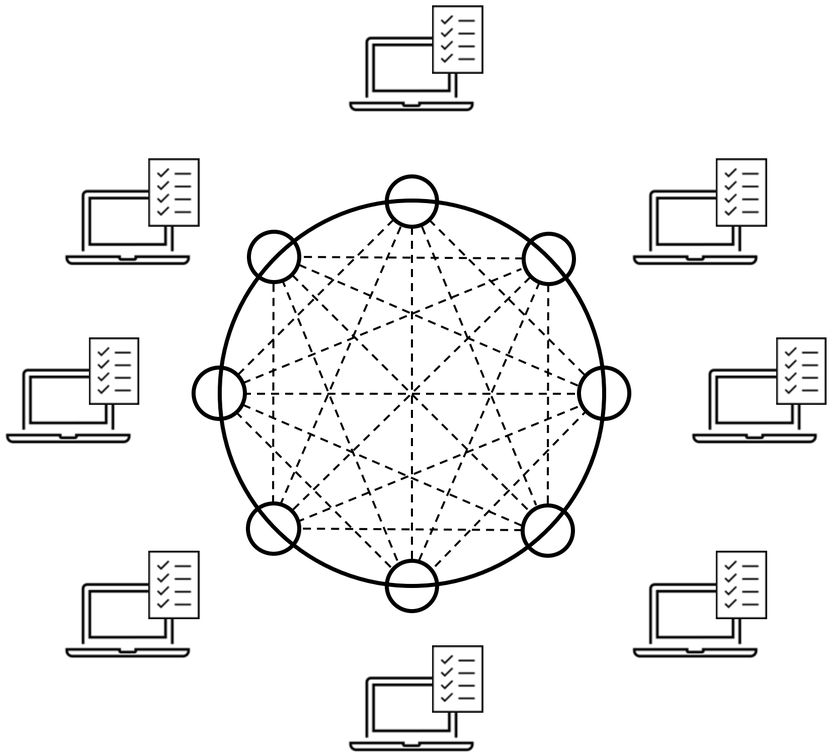
Trust Era

Public blockchain & distributed ledgers

- Speed
- Access & collaboration
- Trust

Distributed ledgers are a key component of Web 3.0 because of their qualities

DISTRIBUTED LEDGER



Entire network records and validates each transaction

CENTRALIZED LEDGER

Single authority verifies, records, and executes transactions

Distributed ledgers are a key component of Web 3.0 because of their qualities

No central point of failure to attack

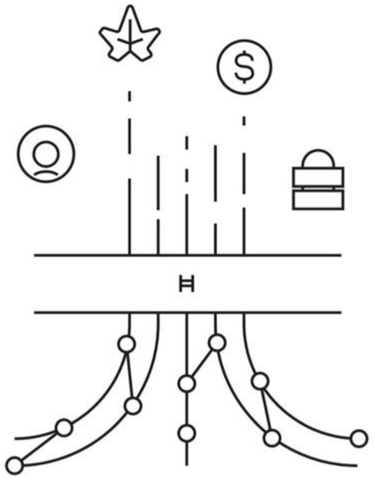
Reliant on strong cryptography to prove data integrity and tamper resistance

Rules for the ledger are determined by a governing concept of some sort

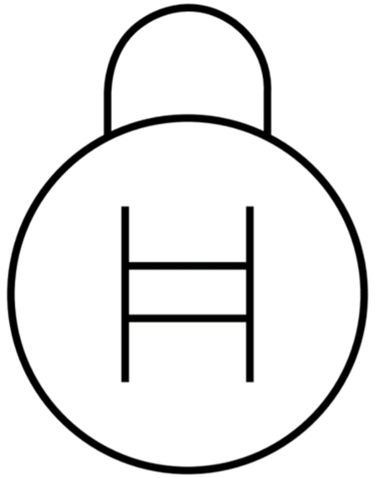
Require a consensus mechanism to determine the rules for adding new transactions to the state of the ledger

DLTs provide a more cost-efficient, accessible, and reliable transaction platform than centralized ledgers

REMOVE THE MIDDLEMAN AND ENGAGE IN DIRECT, TRUSTED TRANSACTIONS



INCREASE ACCESSIBILITY AND BUILD TRANSPARENT APPLICATIONS



PROTECT THE LEDGER WITH CONTROLLED MUTABILITY AND TAMPER-APPARENCE

What is Hedera?

hellofuture

Applications powered by Hedera

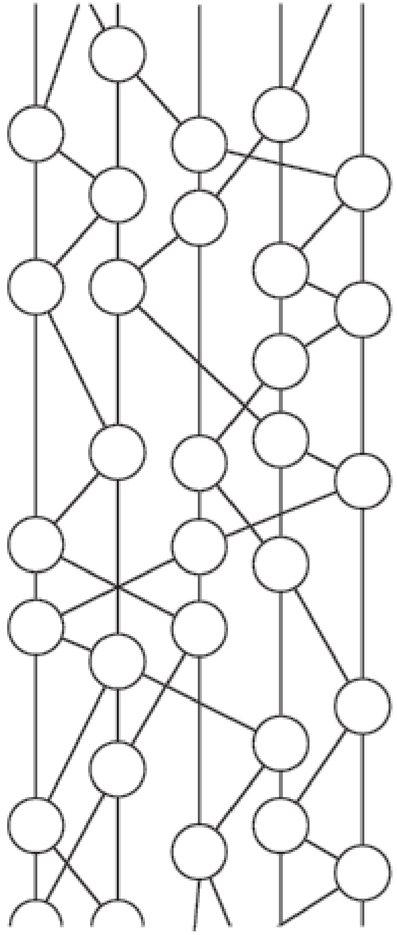
From innovative web3 ecosystems to Fortune 500 companies, developers are building the next generation of the web on Hedera

Open Source Layer 1

EVM Network

What makes Hedera different?

Technology



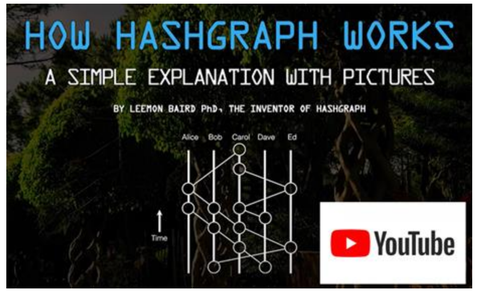
The Hashgraph consensus algorithm is fast, secure, and truly scalable

HyperLedger Besu EVM Client as execution layer for smart contracts

SDKs for Java, JavaScript, Go, Swift, C++, and Rust

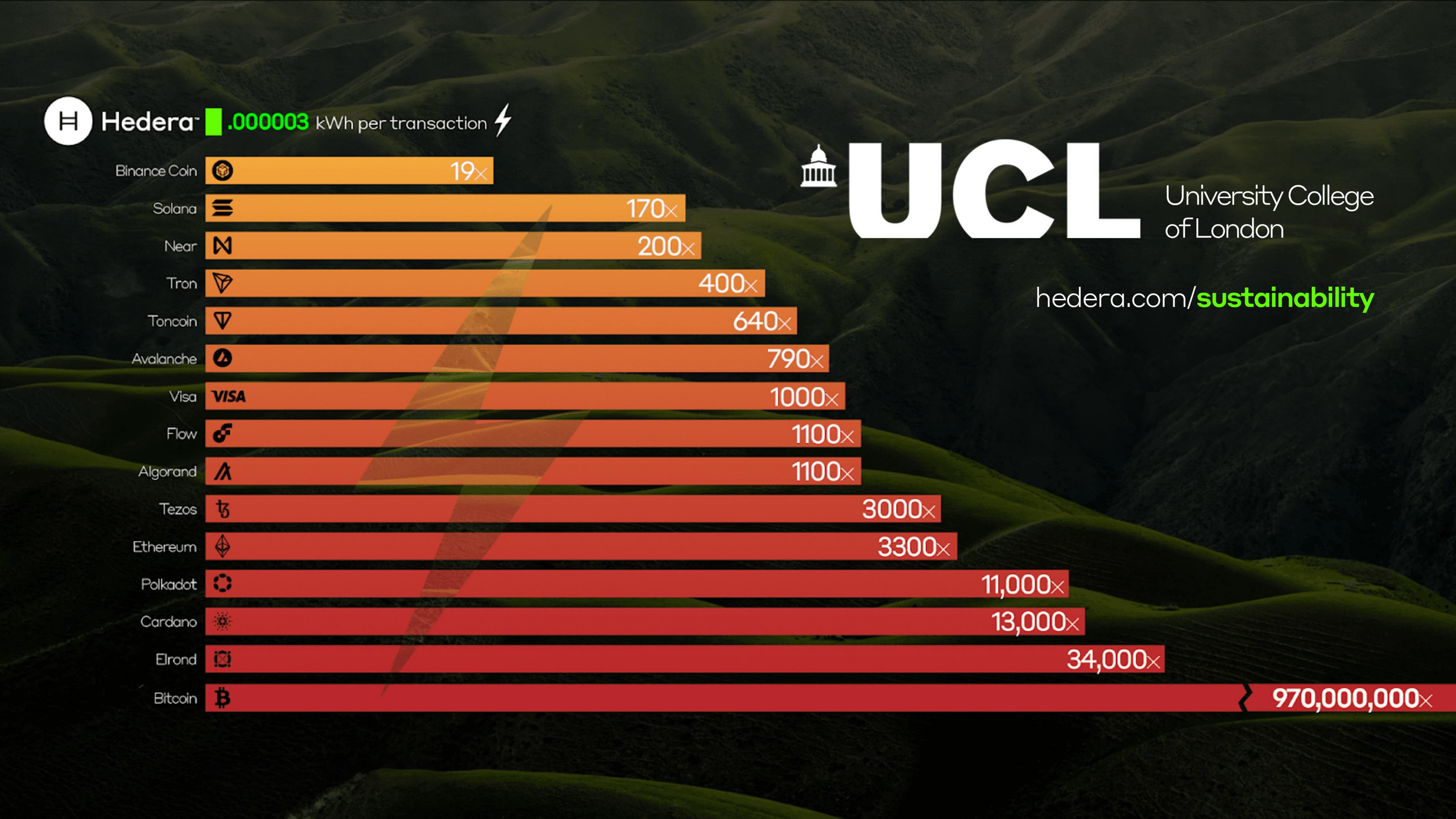
Hashgraph algorithm enables…

- Fair ordering: no MEV ✅
- No leader-based moments: leaderless ✅
- Secure consensus – No waiting or trust: aBFT ✅
- USD-denominated fees: Fixed costs ✅



Governance

abrdn · Australian Payments Plus · Avery Dennison · BitGo
Boeing · Chainlink Labs · COFRA · Dell Technologies
Dentons · Deutsche Telekom · DLA Piper · EDF
Google · Hitachi · IBM · IIT Madras
LG · LSE · Magalu · Mondelēz International
Nomura · servicenow · Shinhan Bank · Standard Bank
Swirlds · Tata Communications · Ubisoft · UCL
wipro · worldpay · zain


Hedera .000003 kWh per transaction
Binance Coin 19×
Solana 170×
Near 200×
Tron 400×
Toncoin 640×
Avalanche 790×
Visa 1000×
Flow 1100×
Algorand 1100×
Tezos 3000×
Ethereum 3300×
Polkadot 11,000×
Cardano 13,000×
Elrond 34,000×
Bitcoin 970,000,000×
UCL
University College of London
hedera.com/sustainability

Hedera is a third-generation public distributed ledger

	1ST GENERATION	2ND GENERATION	3RD GENERATION
	Bitcoin Blockchain	Ethereum Blockchain	Hedera™ Hashgraph
TRANSACTIONS PER SECOND	3+ TPS	12+ TPS	10,000+ TPS
AVERAGE TRANSACTION FEE	$4.5 USD	$1.3 USD	$0.0001 USD
AVERAGE TRANSACTION CONFIRMATION	10-60 MINUTES	10-20 SECONDS	3-5 SECONDS (W/ FINALITY)

1. https://ycharts.com/indicators/bitcoin_average_transaction_fee
2. https://ycharts.com/indicators/ethereum_average_transaction_fee

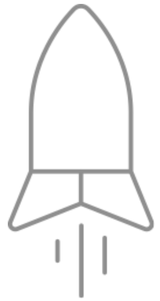
A comparison of third-generation DLTs

	polygon	Algorand		3RD GENERATION Hedera™
TRANSACTIONS PER SECOND	7000* (CLAIMED)	7,500† (APPROX)	12+ TPS	10,000+ TPS
AVERAGE TRANSACTION FEE	$0.002 USD (VARIABLE)	0.001 ALGO (FIXED)	$1.3 USD (VARIABLE)	$0.0001^ USD (FIXED)
AVERAGE TRANSACTION CONFIRMATION	5 - 10 SECONDS (LEADER BLOCK CREATION)	3-5 SECONDS (LEADER BLOCK CREATION)	10-20 SECONDS (LEADER BLOCK CREATION)	3-5 SECONDS (W/ FINALITY)
ENERGY USE PER TRANSACTION	90+ KWH	0.00534 KWH	102+ KWH	0.000003 KWH

Hedera TPS
Algorand TPS
Polygon TPS
http://blockchain.cs.ucl.ac.uk/blockchain-energy-consumption/

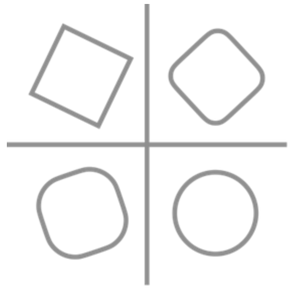
Why build on Hedera?

Hedera helps you meet strict requirements in the following areas…

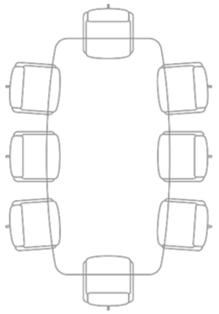


Performance

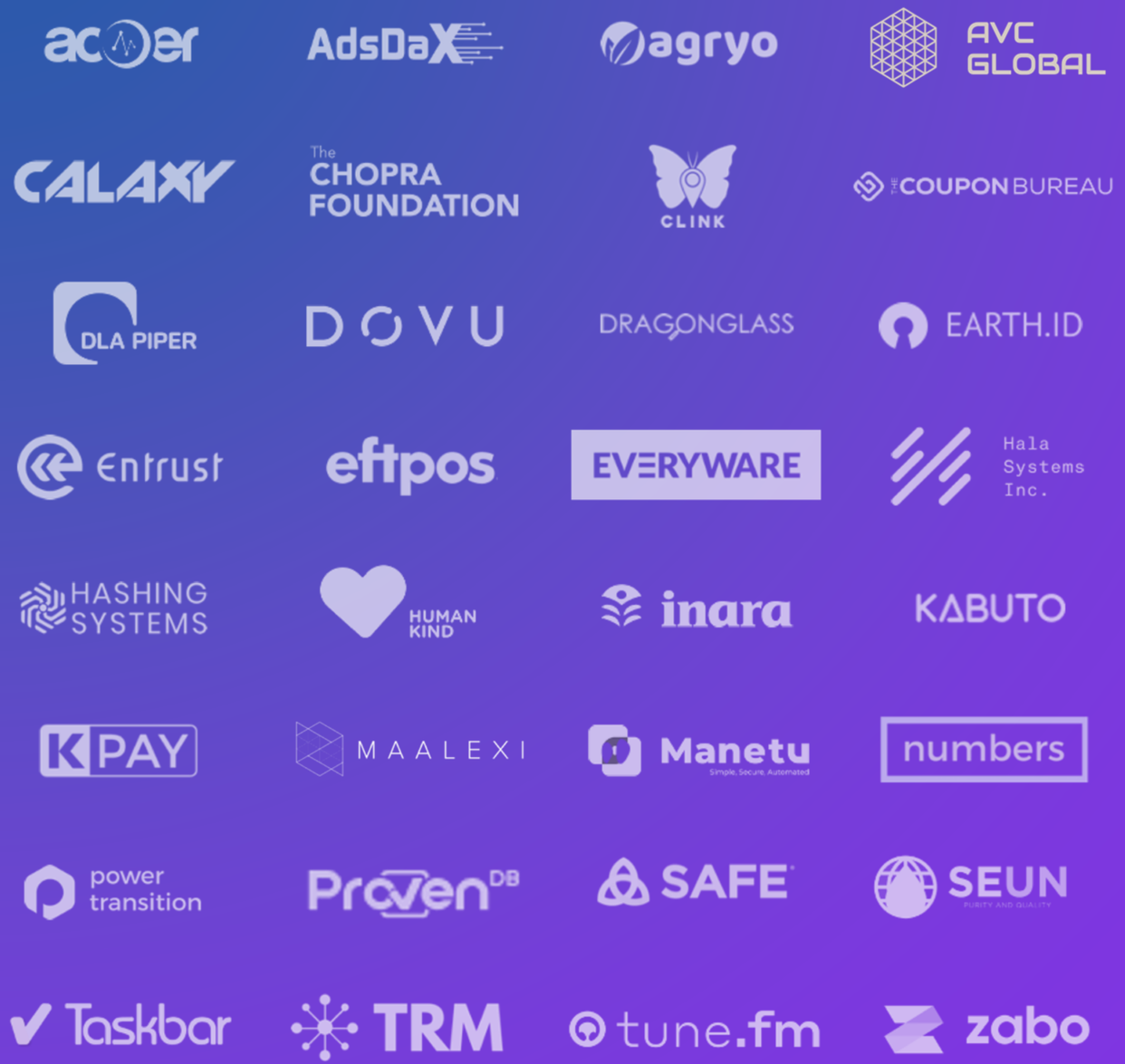
Security



Stability



Governance



>THOUSANDS OF ACTIVE DEVELOPERS

Attending global hackathons, meetups, and active in Discord

>100 APPLICATIONS

In production on Mainnet, since open access on Sept. 2019

>71,000,000,000 TXS TO DATE

Most used public DLT. All transactions counted are submitted and paid for by users

>6,500,000 TOTAL ACCOUNTS ON MAINNET

Over 2,500,000 accounts created in 2024 YTD

HELLO FUTURE HACKATHON 2.0

REGISTRATIONS CLOSE: 16 DEC

HACKATHON PERIOD: 11 NOV – 18 DEC

Register | Join Discord

$300K Prize Pool

https://hedera.com/hackathon

Start building on Hedera

END USERS

INDIVIDUALS

ENTERPRISES

GOVERNMENTS

DEVICES

APPLICATION USE CASES

DATA INTEGRITY

TOKENIZATION

DECENTRALIZED IDENTITY

SUPPLY CHAIN

PAYMENTS

CONSENSUS SERVICE

TOKEN SERVICE

SMART CONTRACTS

PRIMARY NETWORK SERVICES

HEDERA GOVERNING COUNCIL

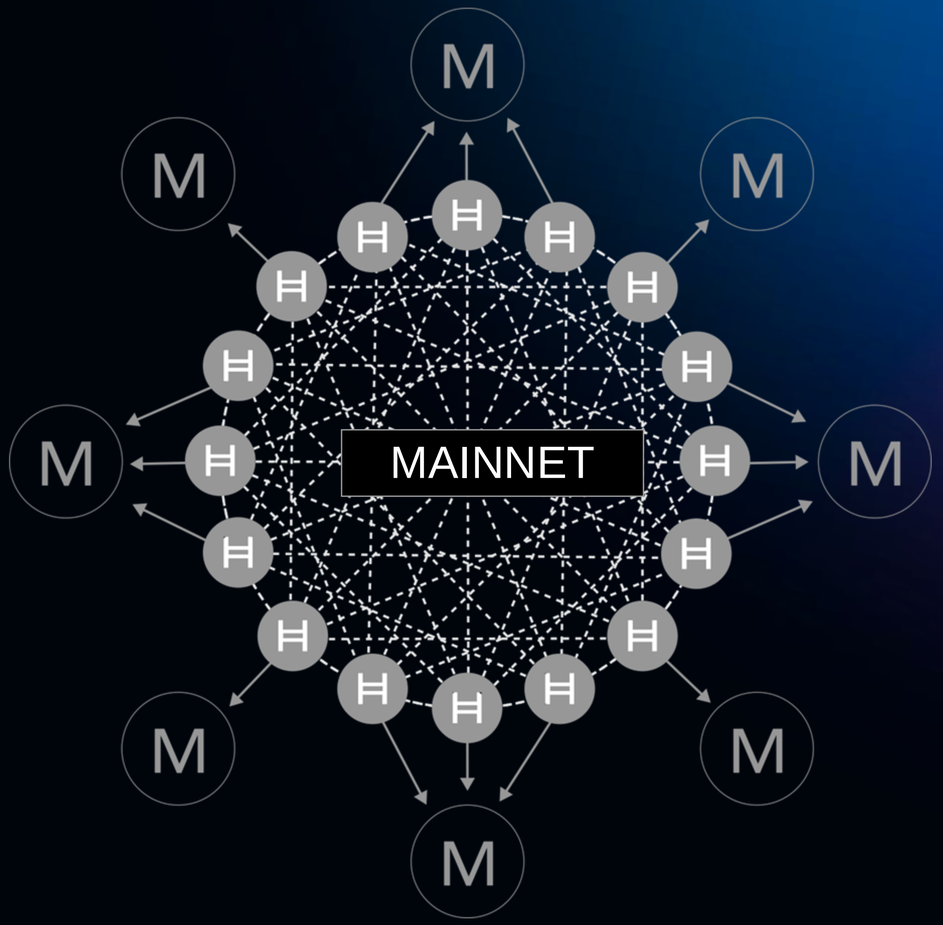
HASHGRAPH CONSENSUS

HEDERA MAINNET & MIRROR NODES

HEDERA MAINNET & MIRRORNET

MAINNET

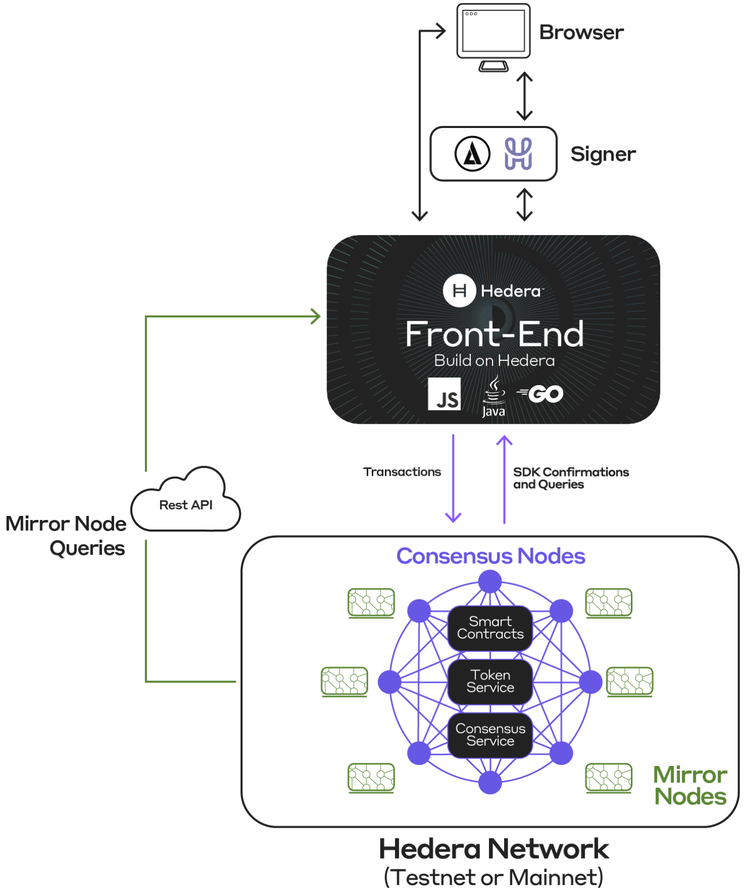
- Can submit HAPI (Hedera API) transactions to the Hedera network
- Contributes to consensus on transactions
- Creates events on the Hedera network
- Requires HBAR cryptocurrency payment for transactions & queries



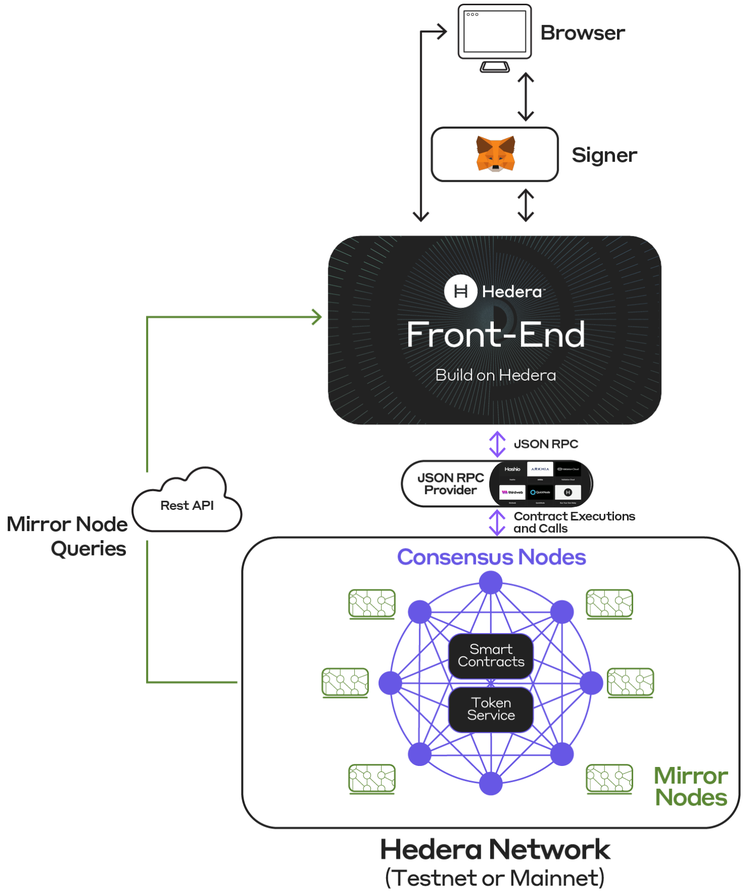
MIRRORNET

- Maintains a history of some or all the Hedera network state and ledger of transactions
- Value-added services (managed read-only node, etc.)
- Enables analytical insight into an application’s state / transactions
- Publish and subscribe capabilities

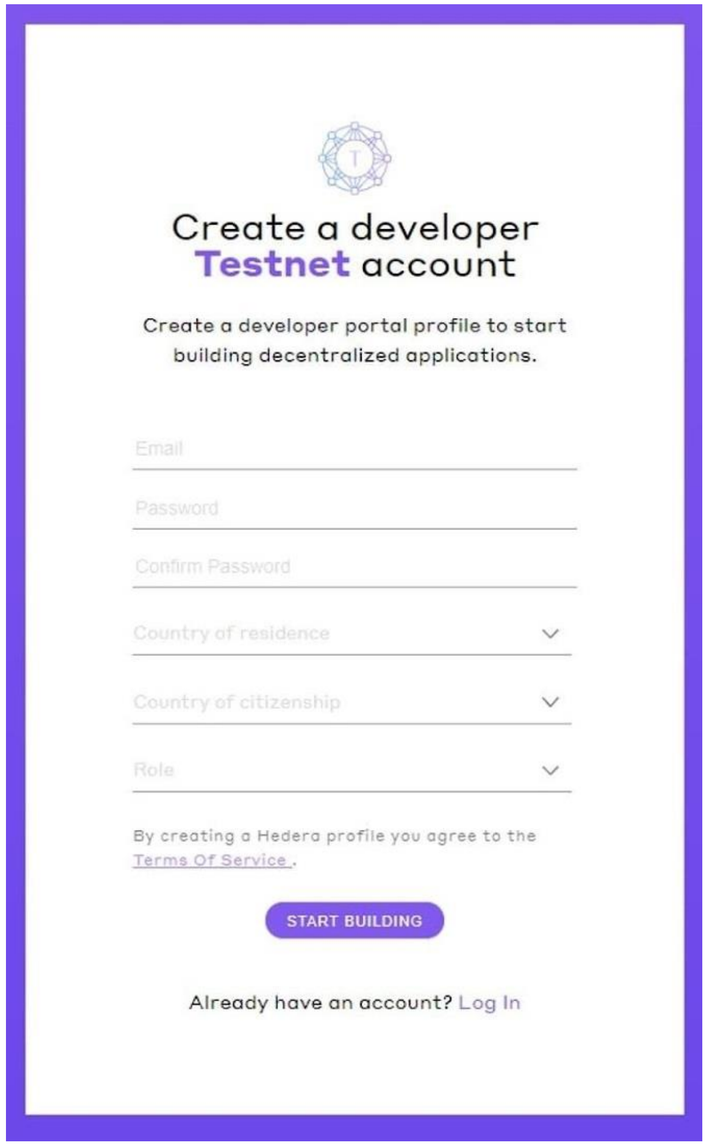
With Hedera SDKs



With EVM Tools



Get a testnet account! (https://portal.hedera.com/register)



Connect to a Network

Step 1: Define environment variables in a **.env** file

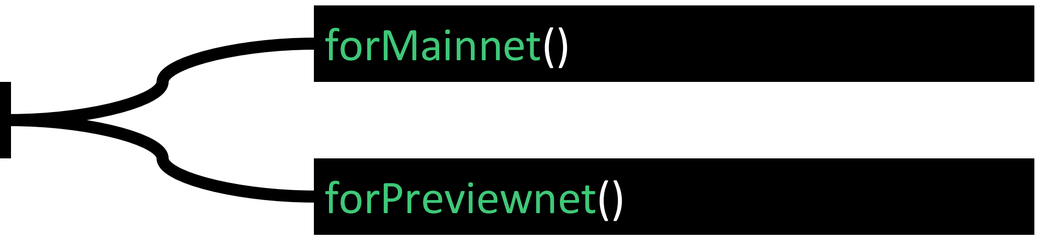
```
ACCOUNT_ID = 0.0.351…
PRIVATE_KEY_HEX = 0x96d…
```

Step 2: Import your Hedera testnet credentials into your application

```
const operatorId = AccountId.fromString(process.env.ACCOUNT_ID);
const operatorKey = PrivateKey.fromStringECDSA (process.env.PRIVATE_KEY_HEX);
```

Step 3: Configure the Hedera client

```
const client = Client.forTestnet()
```




```
client.setOperator(operatorId, operatorKey);
```

Cryptocurrency

“Hedera is the only platform we’ve seen that can cope with the volume of split-second transactions that need to take place.”

Jiro Olcott | Director | Power Transition

Scalable transactions

Guaranteed finality in 2-5 seconds

10,000 tps, in a single shard

Used to pay for network fees

HBAR is Hedera’s native coin

Used to pay for each network API call

Security Mechanism

Hedera is a proof of stake network

Malicious actors would need to control 1/3rd of the total HBAR supply in order to launch an attack

(Click anywhere to open in browser)

Consensus Service

“There are a number of challenges in using traditional ordering services for decentralized applications. By exposing this capability, Hedera is making a meaningful contribution to furthering the capabilities of distributed networks.”

Bryan Gross | Principal Product Manager | IBM Blockchain

Build with native performance

Create applications that demand high throughput 10,000+ txs per second, per shard

Amplify trust

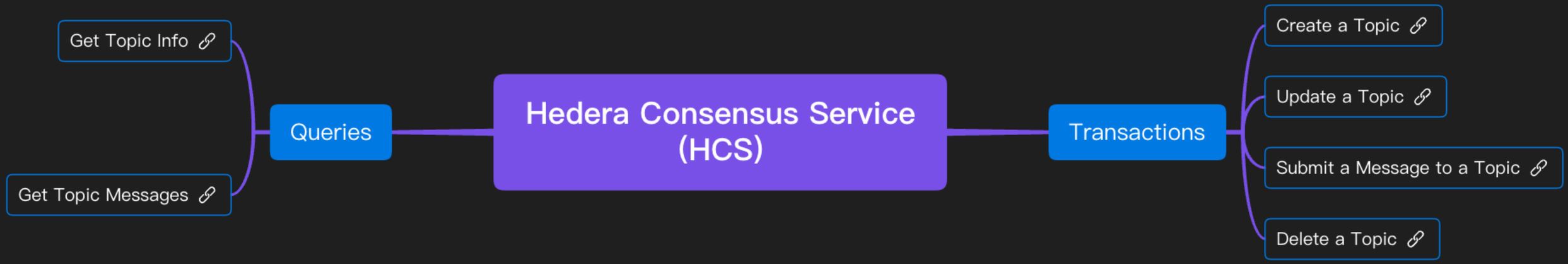
Validate the data in a multi-party database, notary service, or anything that needs transparency with shared infrastructure

Guarantee order

Results in a fair total consensus order, with accurate timestamps, a running hash of order in the topic, along with a state proof that guarantees it is correct

Integrate into existing ecosystems

Open-source integrations with Hyperledger Fabric create new architectures



(Click anywhere to open in browser)

Token Service

“We have already created a use case [for our clients] about asset tokenization. The origin of that comes from talking to our commercial clients who have large commercial real estate assets that are difficult to manage.”

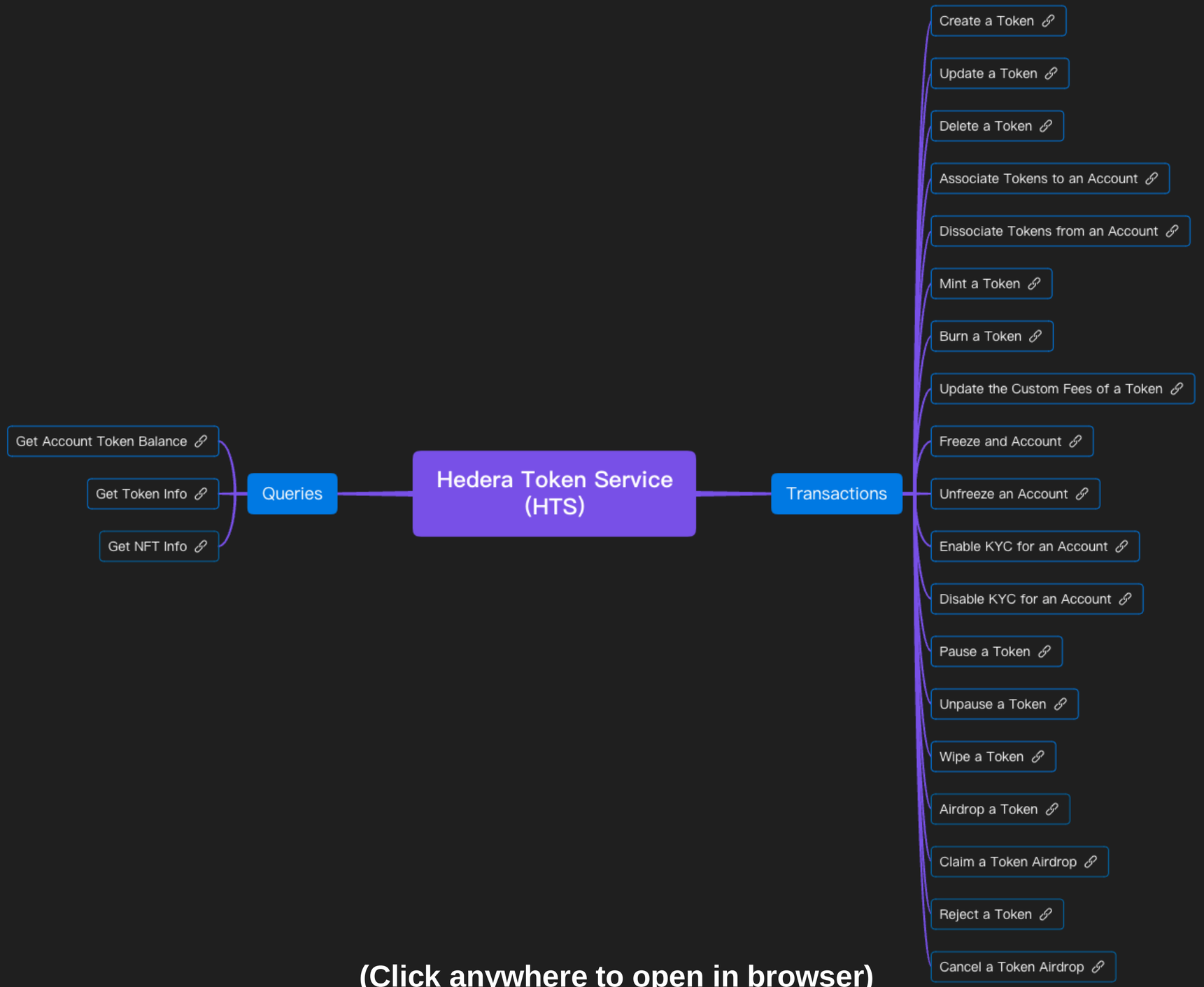
Scott Thiel | Partner &
Hedera Governing Council Member | DLA Piper

Tokenization made simple

Mint and manage fungible and non-fungible tokens without needing to deploy a smart contract

Tokenize natively

High-throughput, compliance configurations, and on-chain programmability



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Hedera Smart Contracts

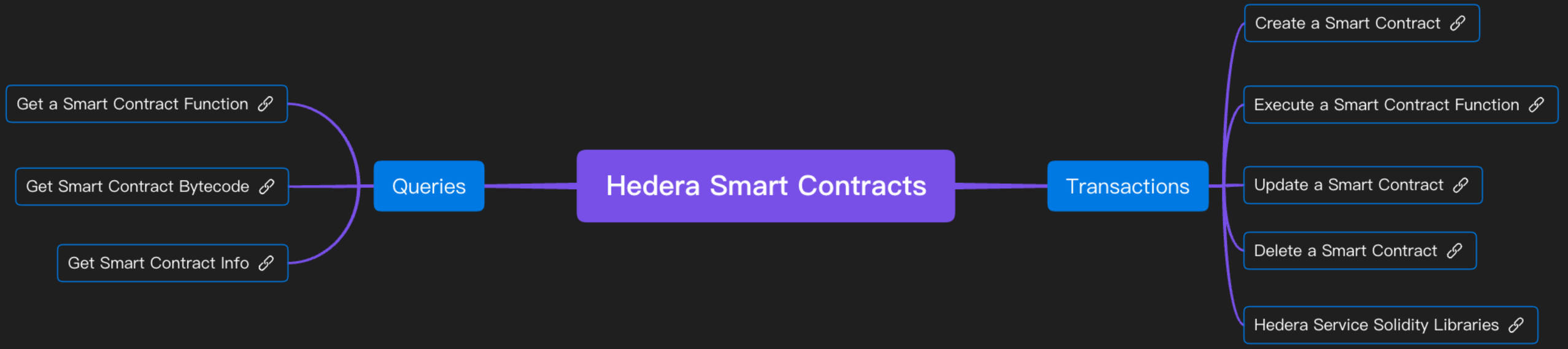
“Hedera has obvious advantages over other L1 blockchains, including speed, trust and cost, and it allows us to think quite frankly and be creative about what a DEX can be and what kind of functionality we can offer our users.”

Pete Campbell | Co-Founder & CEO | SaucerSwap

Build Using Solidity
Run smart contracts written in Solidity, unchanged and using existing standards.

Fair Transaction Ordering
Like all services, smart contracts are executed in order received, never the amount of gas paid. No need to pay extra to be included earlier in history.

Admin privileges
Transparently define administrative keys to a contract, allowing owners to make sometimes drastically needed alterations to an otherwise immutable contract…
Or not, it’s up to your implementation!



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Hedera Starter Examples - JavaScript SDK

This repo shows how you can use the Hedera JavaScript SDK to to build applications using the Hedera service. One example is included for each of the following services:

- Hedera Consensus Service (HCS): index-consensus.js
- Hedera Token Service (HTS): index-token.js
- Hedera Smart Contract Service (HSCS): index-contract.js

This repo includes the PDF slides from the Hedera 101 workshop. Review the slides here

Try It in Gitpod

Open in Gitpod

https://tinyurl.com/yzmttzc9

Hedera Tokens Tutorial CYOA

Choose-your-own-Adventure: Mint and Transfer tokens the EVM way and the Hedera-native way.

Open in Gitpod

What you will learn

- Create a fungible token in Javascript using Hedera Token Service (HTS).
- Create an ERC20 token in Solidity using Hedera Smart Contract Service (HSCS).
- Discover how these 2 services can interoperate.

This is a hands-on session - all you need are a browser and a github account.

https://tinyurl.com/4zdav8vj