



WELCOME

Blockchains and Blockchain Bridges Pan-IIT Blockchain Hackathon



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2021-22 (Q1) in a Nutshell

100+

Talks & Lectures

6,000+

PhDs, Faculty, Students

6+

Audience Countries

3

Books

\$3.5
Mn+

Loans to Farmers

21

Awards & Recognitions



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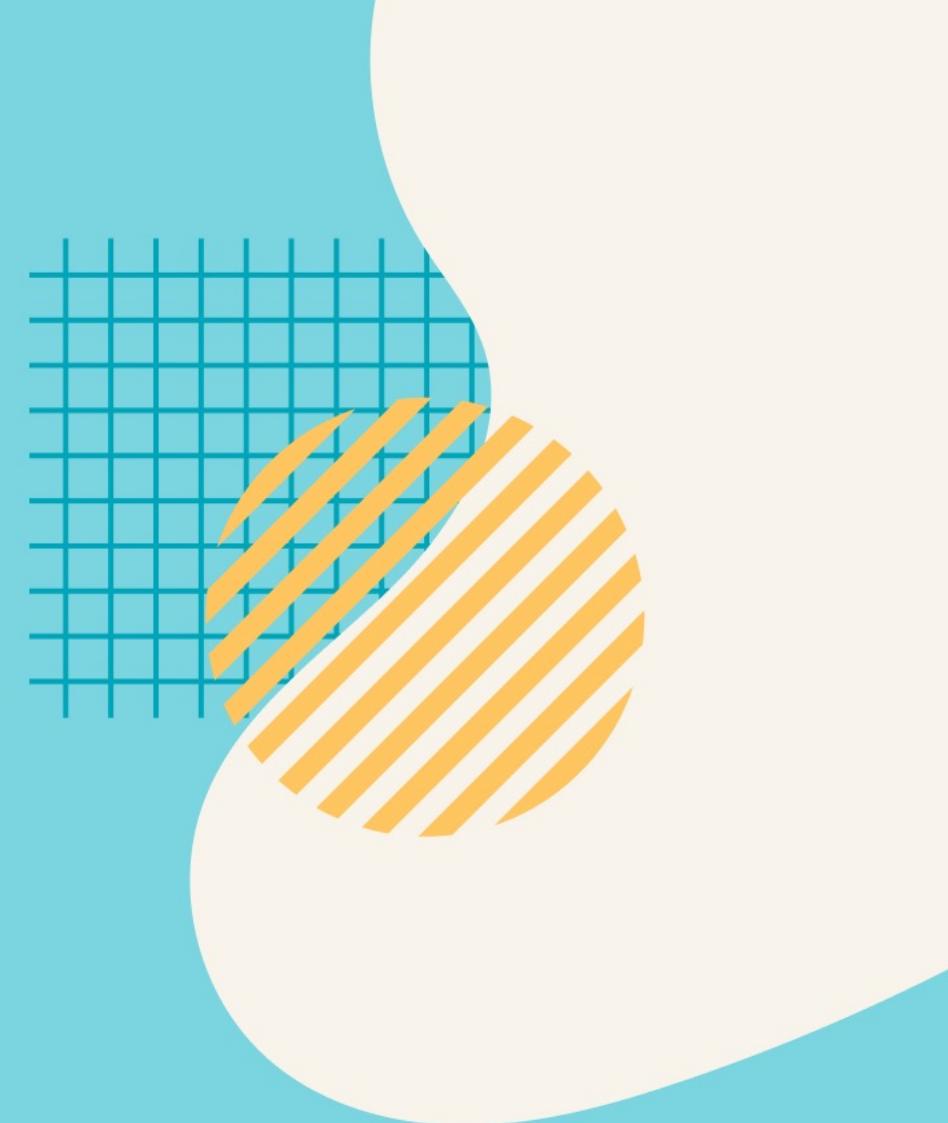
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<https://www.twitter.com/abhib3012>



Agenda

1. Problem Statement Reveal
2. Blockchain Essentials
3. More Pieces of Tech
(and Bridges)
4. Career Pathways
5. A Quick Taste of
Blockchain, Crypto and DeFiLIVE



Let's know you a bit

Q: How many have checked a Public Explorer before?

Q: How many have used a Wallet before (any kind)?

Q: How many have set up their Own Private Blockchain N/W(s) (from scratch, of course)?

Q: How many have built full-fledged ‘dApps’ before?

Q: How many of you own any kind of NFTs in your wallets?

Q: How many of you have interacted with DeFi products/platforms before?

Hackathon Problem Statement

Context & Case:

The 2nd generation of Blockchain Technology was marked by Ethereum's efforts towards making contracts and tokens work on a Blockchain. Subsequently the network grew by leaps and bounds, mostly rendering efficient and cost-effective computation as a whim. Soon new protocols were built - either on top of the Ethereum Network as L2 (Layer 2) sidechains, or as completely separate ecosystems sporting a variety of virtual machines for executing contract codes written in a further variety of languages and stacks.

Additionally, the emergence of NFTs has brought about serious changes in the token economies and what kinds of assets can be represented on a blockchain – opening up multiple doors of possibilities. In the case of NFTs, Non-Fungible Tokens, every token can have different characteristics – they can represent pokemons or even the agricultural commodities stored by a farmer in a warehouse – quite limitless in terms of representations and possibilities.

Problem statement:

The problem with tokens these days is not the standard they follow (such as ERC20 or ERC721 or ERC1155), rather, it is the restrictions of the base technology which limit the use case of these tokens.

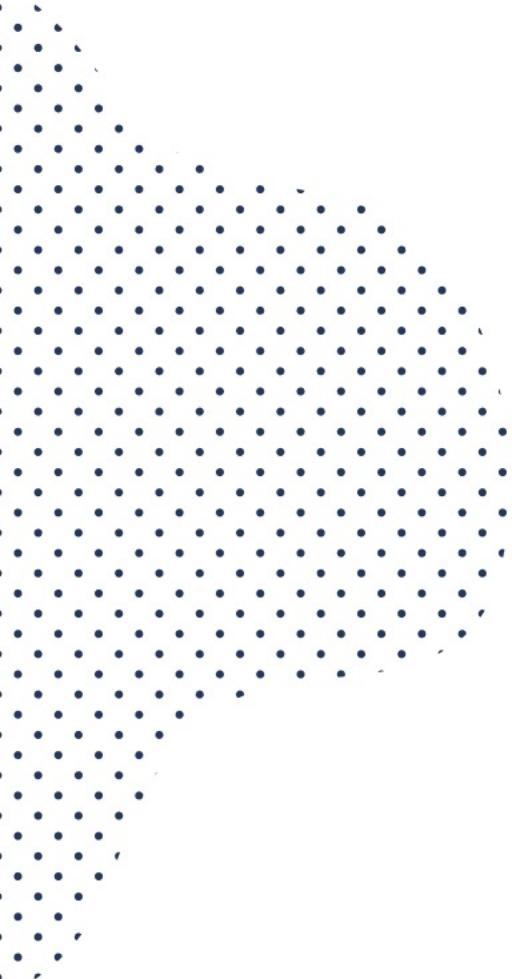
To make all these blockchains work in a coherent manner, many projects have come up with Bridges that uniquely represent assets cross-chain and allow for seamless transfers.

The task is to build such two bridges for cross-chain asset transfers between ETHEREUM - SOLANA and between ETHEREUM - AVALANCHE. Assets must be of Non-Fungible type.

What does your final Delivery need to look like?

1. A video recording of end to end product flow
2. (optional): You can choose to record yourself speaking as well, in case you want to explain something specific. Also, this must be done if you believe a mute-video is not self-explanatory enough.
3. An open Github repo link with a **proper README file** describing how to use the MVP.
4. A 2-pager document / presentation / writeup to assist you while demoing your MVP on the final demo day.

P.S: Resource Links provided at the end



Blockchain Essentials



Firstly, Out of Everything Why Blockchain?

NO CENTRAL POINT OF FAILURE

Fragile centralized databases.

Central databases that we know are too fragile, in that they form a single point of failure. Data with an entity gets affected –and, that's it. Everything gone – no one else knows what was in there.

TRUST

Trust comes before Technology in Business

Technological specifications don't matter as much as trust matters in business. Need of centralization has only been to gauge trust using a single, third-party entity.

IMMUTABLE | HACK-PROOF

Scams, Scandals happen because data can go poof.

For the first time, people got a technology that's practically hack-proof. Anything that goes on a blockchain, will stay there for the lifetime of the blockchain.

Myths of Blockchain

MYTH 1

Blockchain == Cryptocurrency

The Bitcoin cryptocurrency was the first implementation of the Blockchain Technology.

This **does not mean** that blockchain is all about crypto, and that one cannot be implemented without the other.

MYTH 2

Blockchain can become everything

Blockchain should only be applied in use cases and sectors that can benefit from the core characteristics.

If you're putting your ToDo app on the blockchain, it's probably a waste and you'll incur useless cost escalations.

Public

BUT

Anonymous

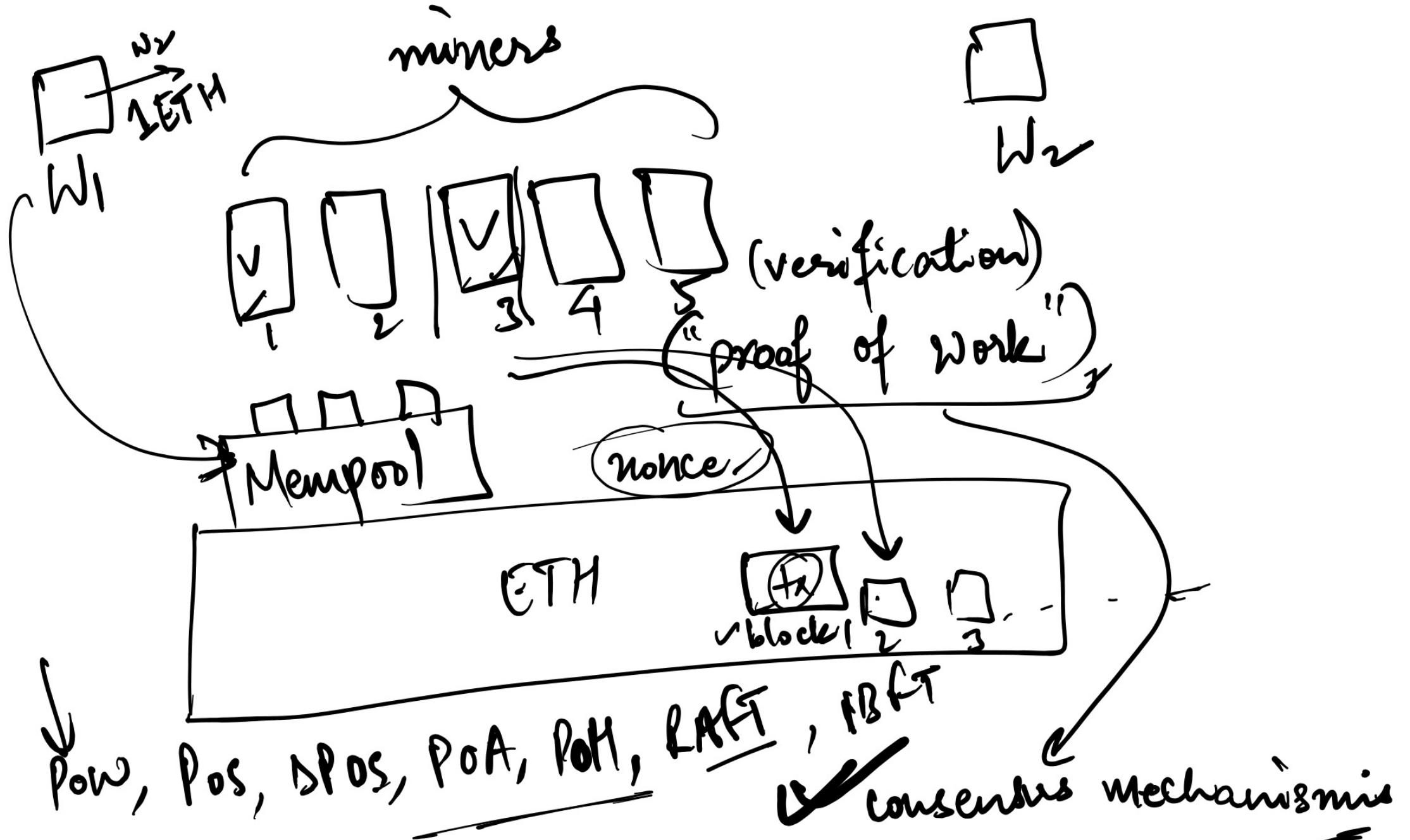
And, how public?

Primary Question 1

What happens after you
initiate a transaction?

Primary Question 2

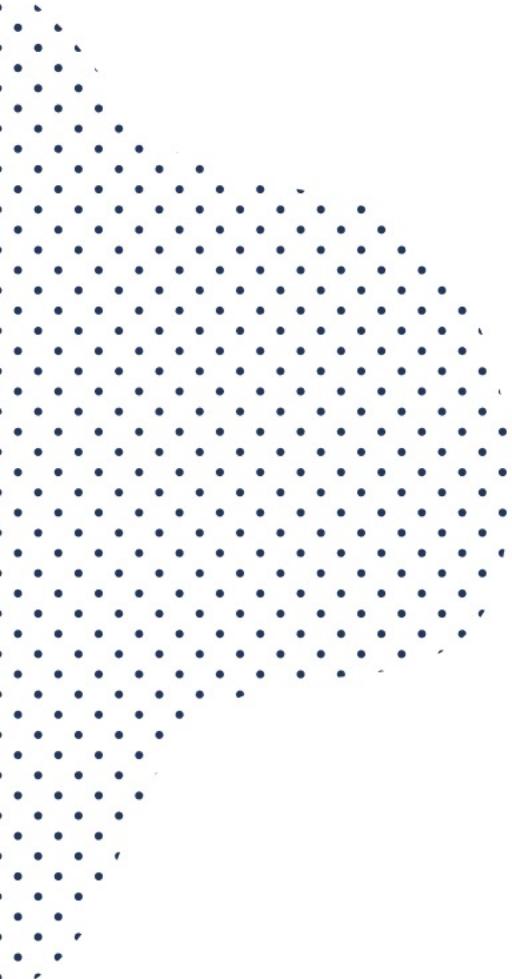
How does a block get
“decentral-ly” added?



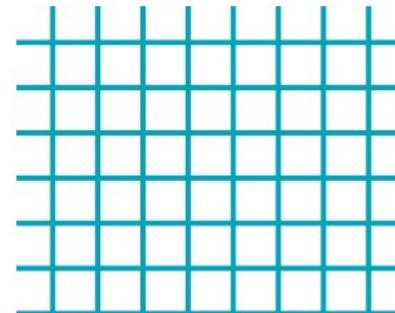
HANDS ON

A Quick Taste of Blockchain Public Explorers, everything out in the open!

<https://etherscan.io>

A decorative graphic on the left side of the slide, consisting of a triangle of blue dots that tapers towards the bottom left.

More Pieces
of Tech



What is Ethereum?

1. A blockchain that works as a currency (Gen 1) as well as a platform to run code (Gen 2).
2. Ethereum is Turing Complete – it needs to be able to solve any computation within polynomial time.
3. Ethereum is a blockchain that has constantly given multiple use cases – ICOs, Multiple Token Standards, Decentralized Finance.

Comparision with BTC

ⓘ Similarities

- Peer-to-peer networking, distributed immutable ledger of transactions
- Proof-of-work consensus algorithm
- Digital assets
- Use of cryptographic primitives (Digital signatures, hash functions)

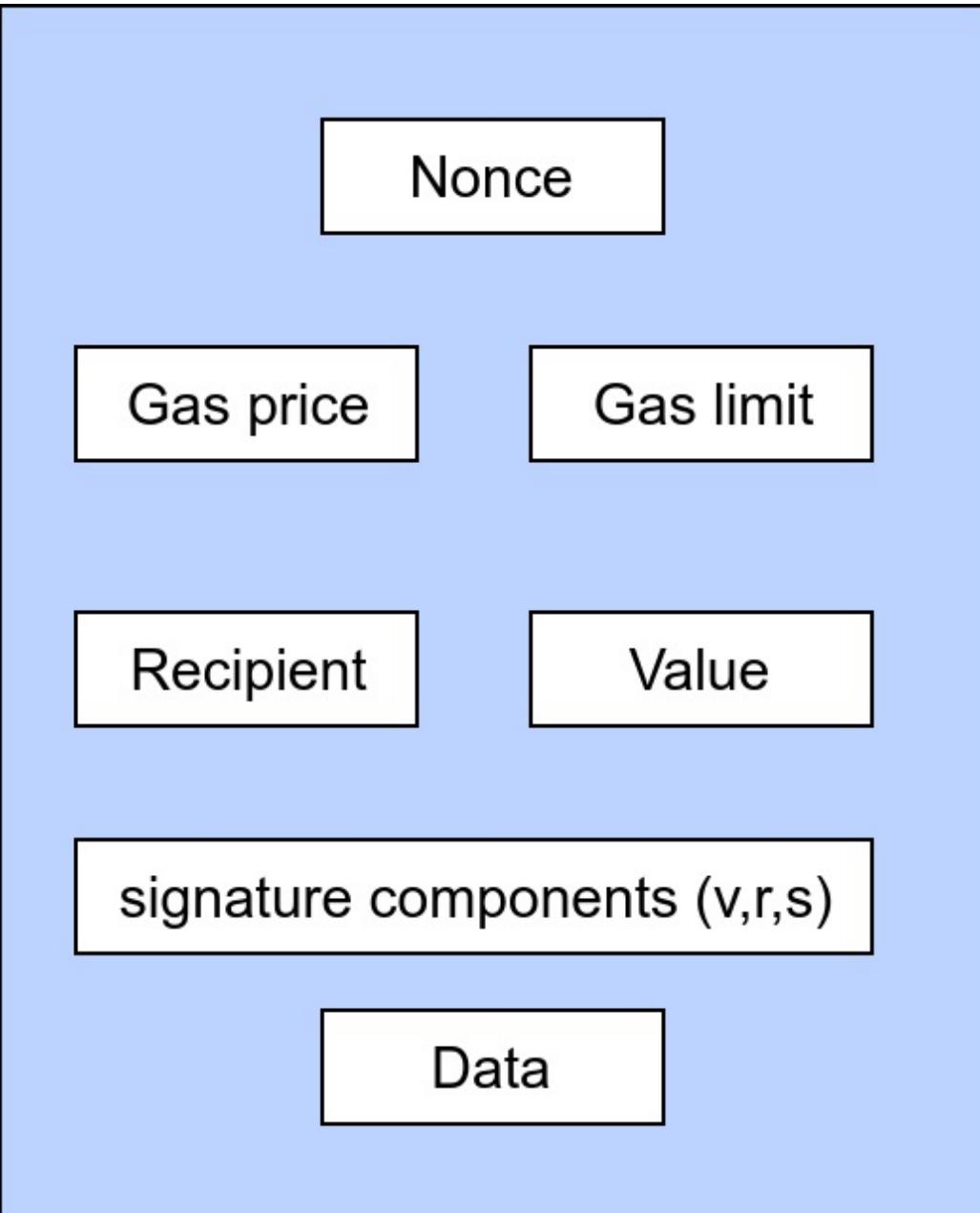
! Differences

- Ethereum can act as a general purpose computer with smart contracts and virtual machine (EVM) - Turing complete
- Ethereum is not just a payment network
- Ethereum doesn't use UTXO model to keep track of payments. Instead maintains the account information in state.

Types of Ethereum Accounts

1. Externally Owned Accounts (EOA): this is a wallet that you create using applications such as MetaMask. **You have the public-private key combination for every such EOA.**
2. Contract Account: Every interaction on the Ethereum blockchain is between two (or more!) accounts. When you deploy a Smart Contract (more on this later), **the contract gets its own address.**
3. Contract accounts can hold Ethers like any normal wallet, and **can send and receive ETH**. However, these are handled by the EVM.

Transactions on the Ethereum Network



Nonce: Incremental number for every transaction from a particular wallet.

Gas price: Price that the sender is happy to pay per unit gas. [Gas is the transaction fuel, so to speak.]

Gas limit: Maximum gas that the sender is willing to spend. A beautiful way to stop infinite loops and give Turing completeness.

Recipient: The receiving address. Determined whether value will be transferred or contract code will be executed.

Value: Total amount of ETH to be transferred in the transaction.

Data: Any metadata regarding the transaction goes here.

```
1   {
2     from: "0xEA674fdDe714fd979de3EdF0F56AA9716B898ec8",
3     to: "0xac03bb73b6a9e108530aff4df5077c2b3d481e5a",
4     gasLimit: "21000",
5     gasPrice: "200",
6     nonce: "0",
7     value: "10000000000",
8   }
```

Smart Contracts

1. Executable code
2. Turing Complete
3. Function like an external account
 - a. Hold funds
 - b. Can interact with other accounts and smart contracts
 - c. Contain code
4. Can be called through transactions

Tools, Libraries and Frameworks

1. Solidity



2. Remix IDE



3. Hardhat



4. MetaMask



5. OpenZeppelin, web3.js, ethers.js, scaffold-eth, eth-hooks.



Bridges

1. What are bridges?
2. Why bridges?
3. Some active bridges

What are bridges?

A blockchain bridge is a connection that allows the transfer of tokens and/or arbitrary data from one chain to another. Both chains can have different protocols, rules and governance models, but the bridge provides a compatible way to interoperate securely on both sides.

Why bridges?

Centralized or decentralized cross-chain and cross-protocol swaps.

What kind of swaps? Tokens, assets, identifiers, data, smart contract calls, off-chain feeds etc.

BSC – ETH Bridge

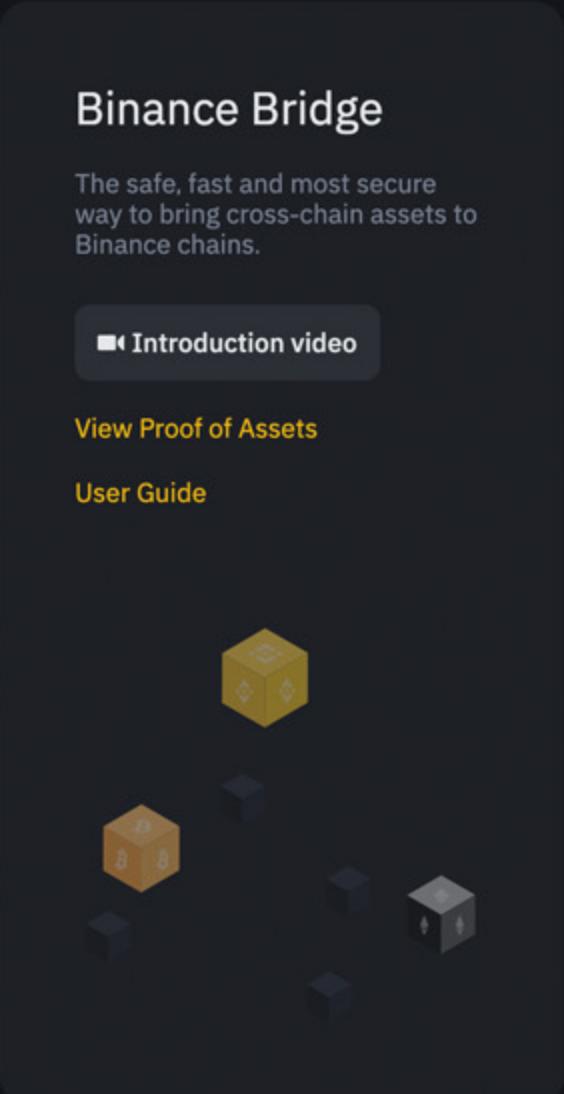
Binance Bridge

The safe, fast and most secure way to bring cross-chain assets to Binance chains.

[Introduction video](#)

[View Proof of Assets](#)

[User Guide](#)



Daily quota ? per address (? / ?)

Asset

USDT

From

TRX Network

To

Binance Smart Chain Network

If you have not add Binance Smart Chain network in your MetaMask yet,
please click [Add network](#) and continue

Amount

0

You will receive ≈ 0 USDT BEP20

Connect Wallet

Polygon – ETH Bridge

Polygon Bridge

The safe, fast and most secure way to bring cross-chain assets to Polygon chain.

[Fast Withdraw](#)

[On Ramp Transfers](#)

[How it works?](#)

[FAQ](#)

[User guide](#)



Deposit Withdraw

From

 Ethereum chain	Balance: 0.00056 ETH
 Ether ▾	0.00
MAX	

↓

To

 Polygon chain	Balance: 0 ETH
---	----------------

Transfer Mode: PoS Bridge

Transfer

Solana – ETH Bridge

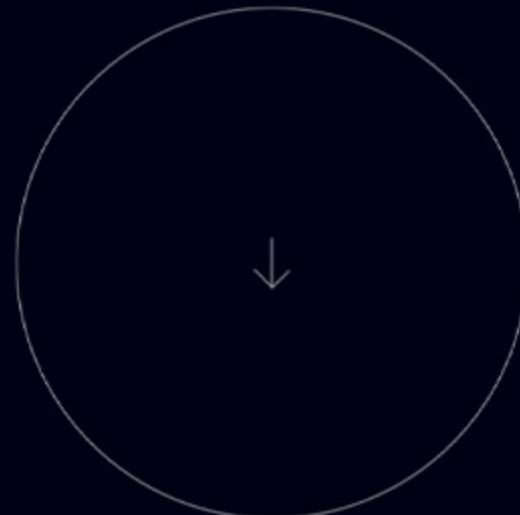
Recent \$320 million hack: <https://www.cnbc.com/2022...>



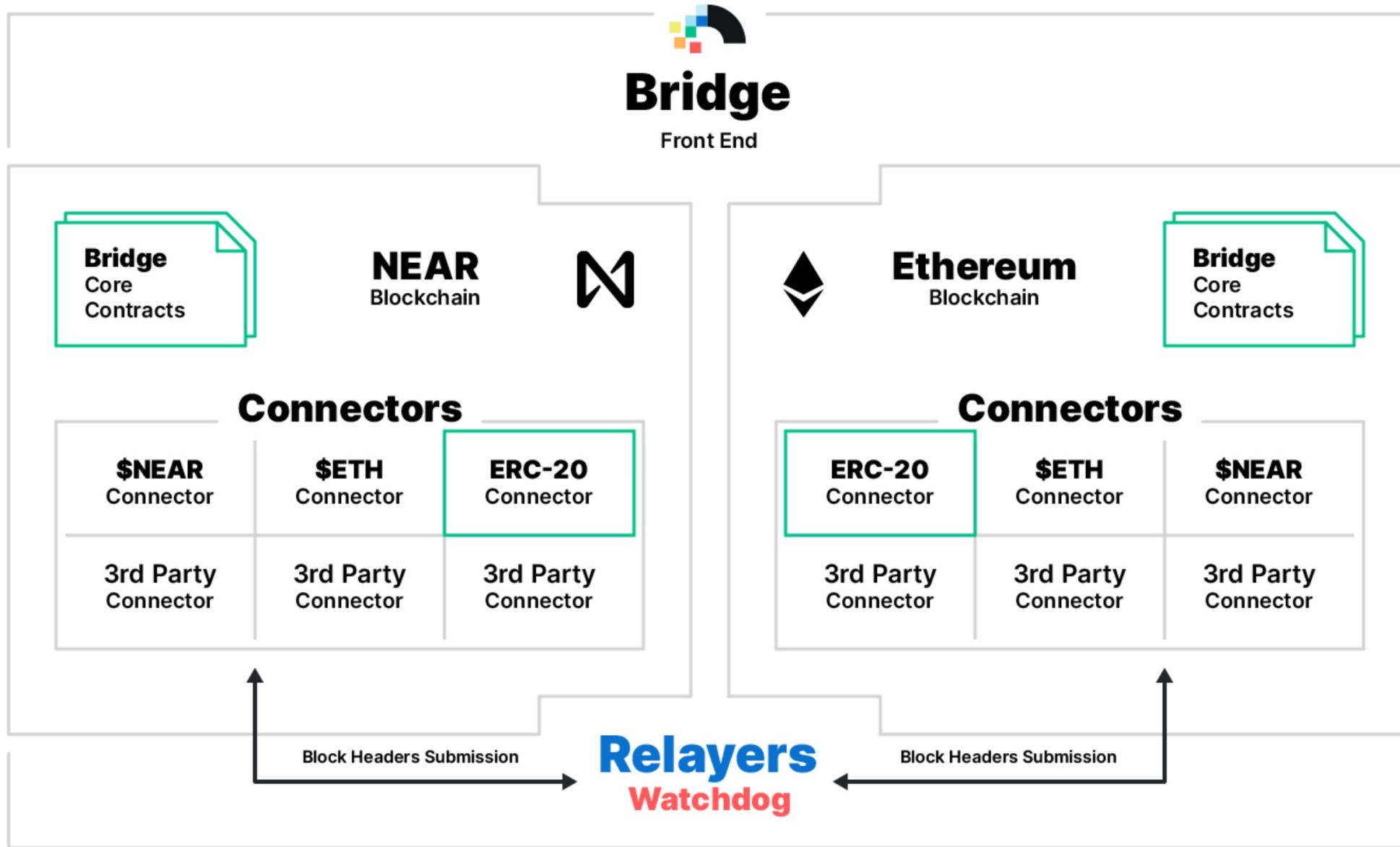
[about](#) [code ↗](#) [jobs ↗](#)

The portal is open.

Wormhole delivers new communication channels between previously siloed blockchains.



NEAR – ETH Bridge





Career Pathways

**What All To Learn?
Where to Go?**

Laundry List

The world's your oyster!

- 1. Decentralization**
- 2. Types and Generations of Blockchain**
- 3. Mining & Consensus Mechanisms**
- 4. Solidity/others & dApp Development**
- 5. Use Cases – Fintech, Healthcare, DeFi**
- 6. Cybersecurity Aspects**

Journeys / Pathways

**Core
Blockchain
Developer**
6 - 8 Mths

**Smart
Contracts
Specialist**
14 - 16 Mths

**Networks /
DevOps
King**
7 - 9 Mths

Journeys / Pathways

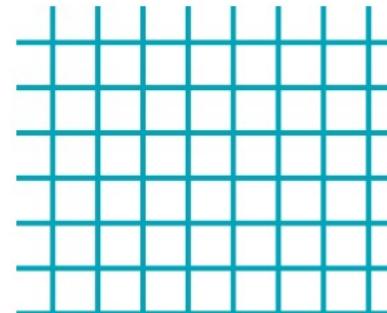
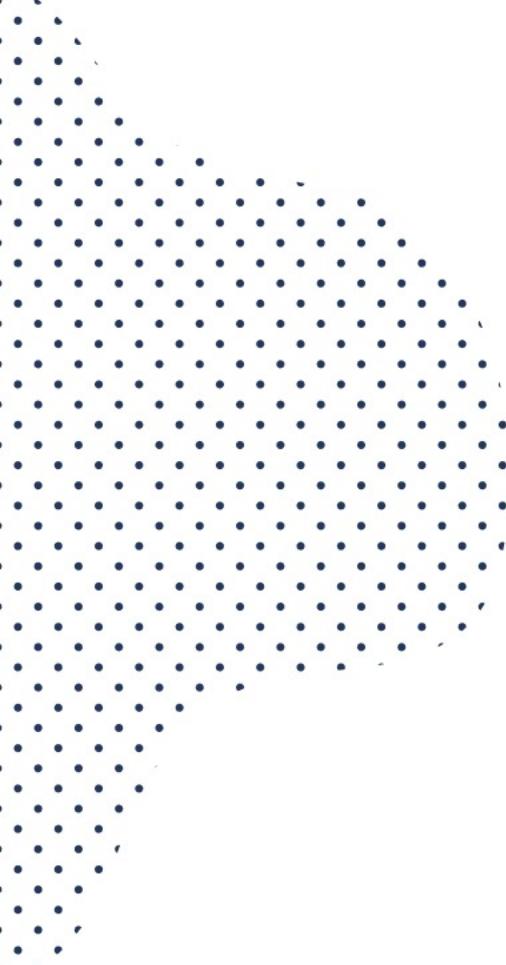
**Product /
Project
Person
4 - 6 Mths /
13 - 15 Mths**

**Smart
Contracts
Auditor
20 - 22 Mths**

**Designer /
Analyst /
Ops
3 - 5 Mths**



Decentralized Finance **(DeFi)**



What is Decentralized Finance (DeFi)?

1. Transparent financial service ecosystem.
2. Available to everyone - any region, any investor category
3. Open-source and highly available
4. P2P or Pool-based finance
5. Multiple financial products rolled up as offerings



HANDS ON

A Quick Taste of DeFi

Lend & Borrow: Compound Finance Testnet

<https://compound.finance>

<https://testnet.aave.com/markets>

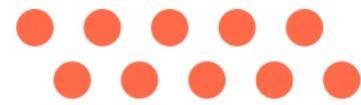
Where Are We Headed Next?

TOP-TIER BLOCKCHAIN PLATFORM COMPARISON

	 elrond	 AVALANCHE	 Polkadot.	 SOLANA	 COSMOS	 fantom	 Ethereum	 Ethereum 2.0	 BINANCE SMART CHAIN	 NEAR
Architecture	Multi-chain (shards)	Multi-chain (subnets)	Multi-chain (parachains)	Single-chain (synchronous)	Multi-chain (IBC-compatible)	Single-chain (synchronous)	Single-chain (synchronous)	Multi-chain (shards)	Single-chain (synchronous)	Multi-chain (shards)
Security	Shared	Shared (validators choose subnets)	Shared (if parachain connected)	Global	Blockchain-specific	Global	Global	Shared	Shared	Shared
Consensus	Secure Proof-of-Stake	Avalanche Proof-of-Stake	Nominated Proof-of-Stake	Proof-of-History	Tendermint Proof-of-Stake	Proof-of-Stake	Proof-of-Work	Casper Proof-of-Stake	Proof-of-Authority	Nightshade Proof-of-Stake
VM/Development	WASM	AVM (Go), Ethereum (EVM)	WebAssembly, Substrate	Sealevel (Rust)	WebAssembly/EVM Cosmos SDK	EVM (Solidity, Vyper)	EVM (Solidity, Vyper)	EVM (Solidity, Vyper)	EVM (Solidity, Vyper)	WASM, Aurora (EVM)
Validator	3,200	973	297	652	125	60	6,000	167,766	21	60
Economics	Fixed transaction fees by type	Fixed transaction fees by type	Market cost for parachain slot	Variable transaction fees	Variable transaction fees	Variable transaction fees	Variable transaction fees	Variable transaction fees	Variable transaction fees	Variable transaction fees
Governance	On-chain	On-chain	On-chain	On-chain	On-chain	On-chain	Off-chain	Off-chain	On-chain	On-chain

Resources & References

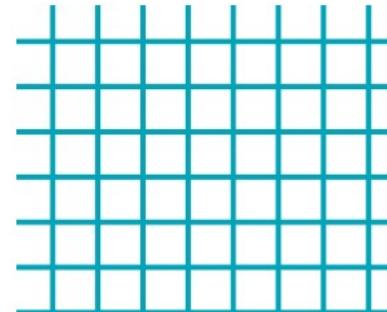
1. <http://ethereum.org>
2. https://medium.com/@austin_48503/%EF%B8%8Fethereum-dev-speed-run-bd72bcba6a4c
3. <https://coinmarketcap.com/alexandria/article/what-are-blockchain-bridges>
4. <https://blog.liquid.com/blockchain-cross-chain-bridge>
5. <https://medium.com/1kxnetwork/blockchain-bridges-5db6afac44f8>
6. <https://blog.makerdao.com/what-are-blockchain-bridges-and-why-are-they-important-for-defi/>
7. Few bridges to demo: <https://news.bitcoin.com/cross-chain-bridges-that-connect-5-different-blockchains-to-ethereum/>
8. Anders Brownworth Blockchain Demo: <https://andersbrownworth.com>
9. Ethereum Explorer: <http://etherscan.io>
10. Hardhat Hackathon Tutorial: <https://hardhat.org/tutorial/>



Feedback – Anonymous & Super-short

<https://bit.ly/10secFeedback>

Will take you **just 10 seconds**, but will help us design hackathons better. :)



Thank you!

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