

# Ethereum

Built on Javascript (not really, but let's roll with it)

Show of hands if you:

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- know what geth is

and that they overthrew the quarians?



# Definitions

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- Blockchain – distributed ledger
- Smart contract platform – a distributed database with stored procedures that can be deployed and executed on-chain
- Clients/Nodes - an application that maintain a local copy of the blockchain and participate in the peer to peer network
- Wallet - an application or piece of code that maintain's a user's private key that allows them to sign transactions and interact with the blockchain

# Fundamental concepts

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- History - blocks and transactions
- State - current account balances and contract storage
- Consensus - coming to agreement on the current tip of the chain and who gets to create the next block



# The anatomy of an Ethereum (d)app

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- The chain - the server
- The smart contract - the backend code (Solidity/Vyper/etc)
- The frontend - your React/Vue/Svelte/etc app

# Javascript in Ethereum

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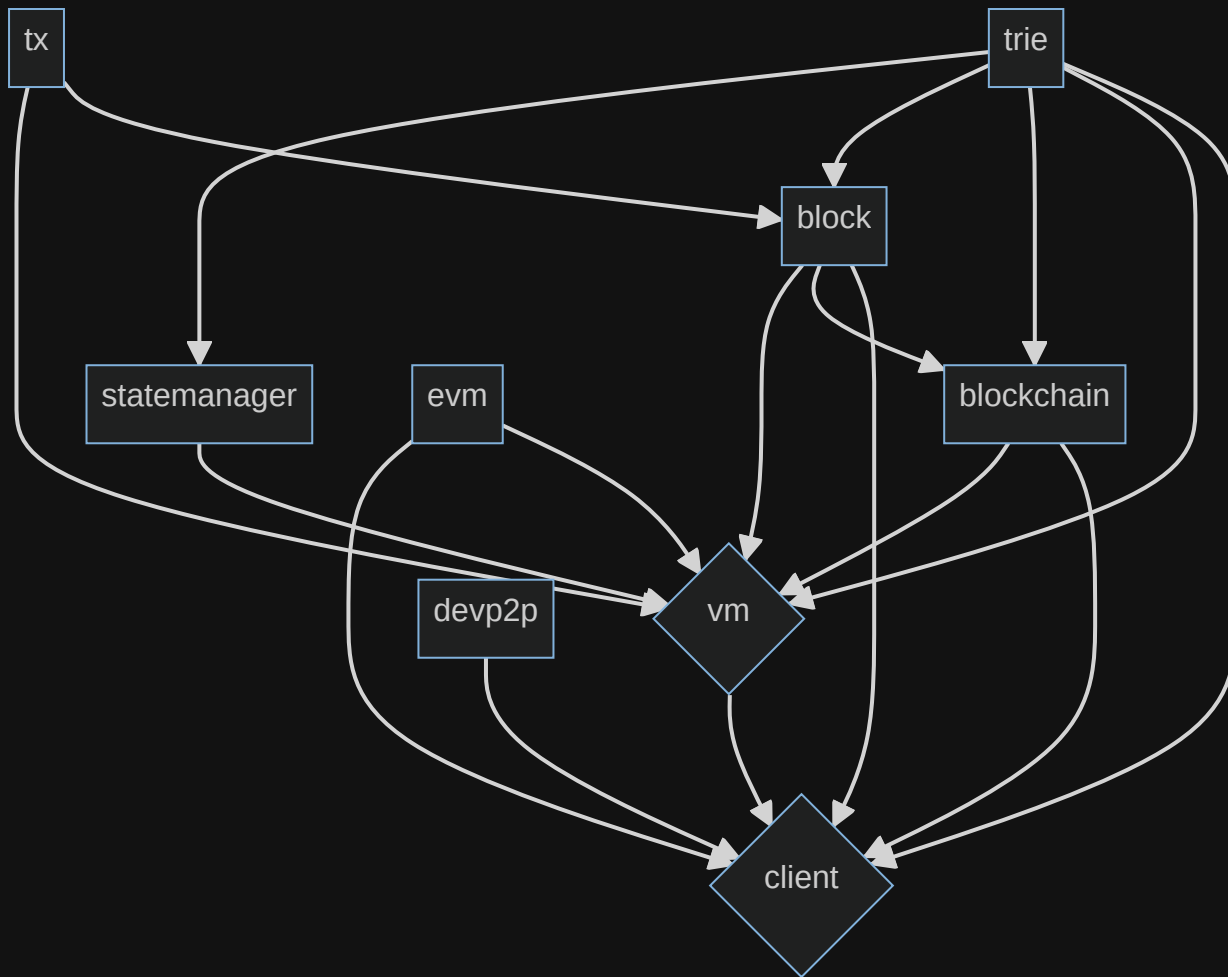
- Backend - EthereumJS/Hardhat/Remix/Truffle/Ganache
- Frontend - Ethers/Web3js

# Backend

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## Ethereum primitives

- Transactions - ``tx`` library - instructions for updating the state of the chain
- Blocks - ``block`` library - units of chain history
- Blockchain - ``blockchain`` library - the history of the chain
- Merkle-Patricia Trie - ``trie`` library - the current state of the chain
- VM - ``vm`/`evm`/`statemanager`` libraries - what runs the bytecode
- Full Node - ``client`` - a Javascript implementation of the Ethereum full node



# Hardhat

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- Ethereum development environment – built on top of EthereumJS
- Local development blockchain
- Solidity compiler - built in smart contract compiler/deployment tools
- Ethers plugin for easy smart contract testing (with types if you're into that sort of thing)

## Frontend – Ethers

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- A swiss army knife full of tools for connecting web apps to Ethereum
- Provider - a standard API for interacting with the Ethereum blockchain
  - Can use a full node or a remote service provider
- Contract - a wrapper object that simplifies interacting with smart contracts
- Utilities - formatters and conversion utilities for switching between hex, bytes, and numbers

# The bonus

All of the above are written in Typescript

# Links



These slides



EthereumJS



Hardhat



Ethers

