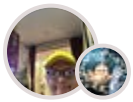
What are Smart Contracts: Your Gateway to Ethereum's Realm



Nova Novriansyah · Follow
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What are Smart Contracts?

Imagine a digital vending machine, but instead of dispensing snacks, it executes transactions autonomously. That's the essence of a smart contract. In Ethereum's blockchain, a smart contract is essentially a program, residing at a specific address, comprising code (functions) and data (state) that automatically enforces predefined rules.

Understanding the Basics

Smart contracts function as Ethereum accounts, capable of receiving transactions and holding balances. Unlike user-controlled accounts, they operate as programmed and are immutable by default. Interactions with smart contracts are irreversible, ensuring rule enforcement without intermediaries.

The Vending Machine Analogy

Picture a vending machine: you insert money, select your snack, and it dispenses your treat. Similarly, a smart contract executes predefined actions based on inputs. Here's how a vending machine-inspired smart contract might look in Solidity, Ethereum's smart contract language:

```
pragma solidity 0.8.7;

contract CupcakeVendingMachine {

    address public vendingOwner;
    mapping (address => uint) public cupcakeInventory;

    constructor() {
        vendingOwner = msg.sender;
        cupcakeInventory[address(this)] = 100;
    }

    function reloadCupcakes(uint quantity) public {
        require(msg.sender == vendingOwner, "Only seller can refill.");
        cupcakeInventory[address(this)] += quantity;
    }

    function buyCupcakes(uint quantity) public payable {
        require(msg.value >= quantity * 0.1 ether, "You must pay at least 0.1 E
        require(cupcakeInventory[address(this)] >= quantity, "Not enough cupcak
        cupcakeInventory[address(this)] -= quantity;
        cupcakeInventory[msg.sender] += quantity;
    }
}
```

Key Features of Smart Contracts

- Permissionless: Anyone can create and deploy smart contracts, provided they grasp smart contract languages like Solidity or Vyper.
- Composability: Smart contracts act as open APIs, allowing them to call other contracts and deploy additional contracts, expanding functionality.

Limitations and Solutions

- Off-chain Data Retrieval: Smart contracts can't access real-world data directly. Oracles bridge this gap by fetching off-chain data and making it available to contracts.

- Contract Size Constraint: Contracts have a maximum size limit. The Diamond Pattern offers a workaround by splitting large contracts into smaller, interconnected ones.

Multisig Contracts: Strengthening Security

Multisig contracts, requiring multiple signatures to execute transactions, mitigate single points of failure and enhance security. They're commonly used for DAO governance, dividing responsibility and minimizing risks associated with private key loss.

With smart contracts at the forefront of Ethereum's decentralized ecosystem, understanding their intricacies opens doors to innovative possibilities in blockchain technology.

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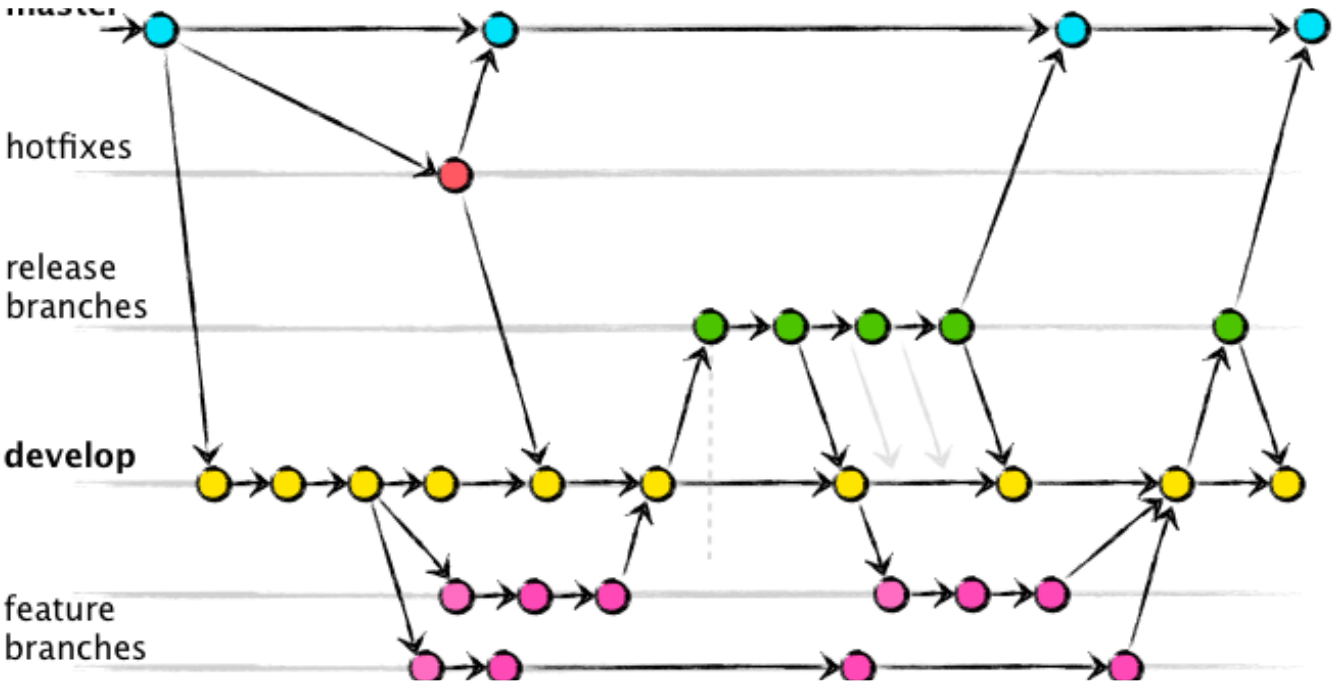

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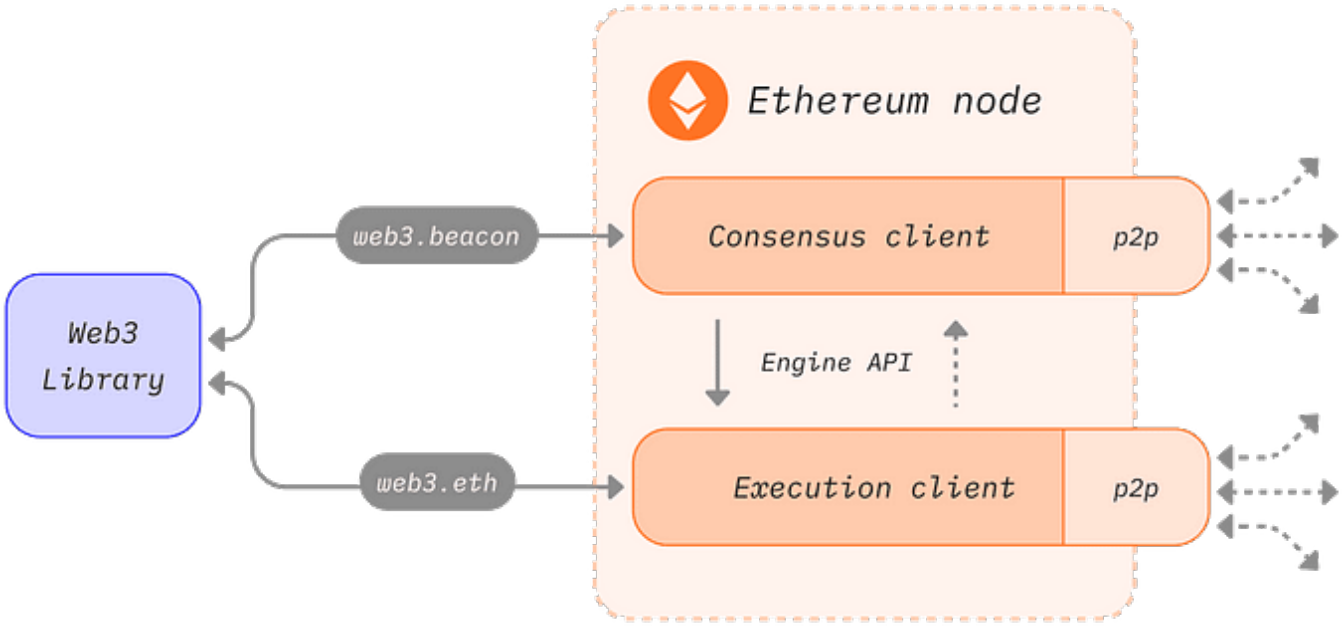

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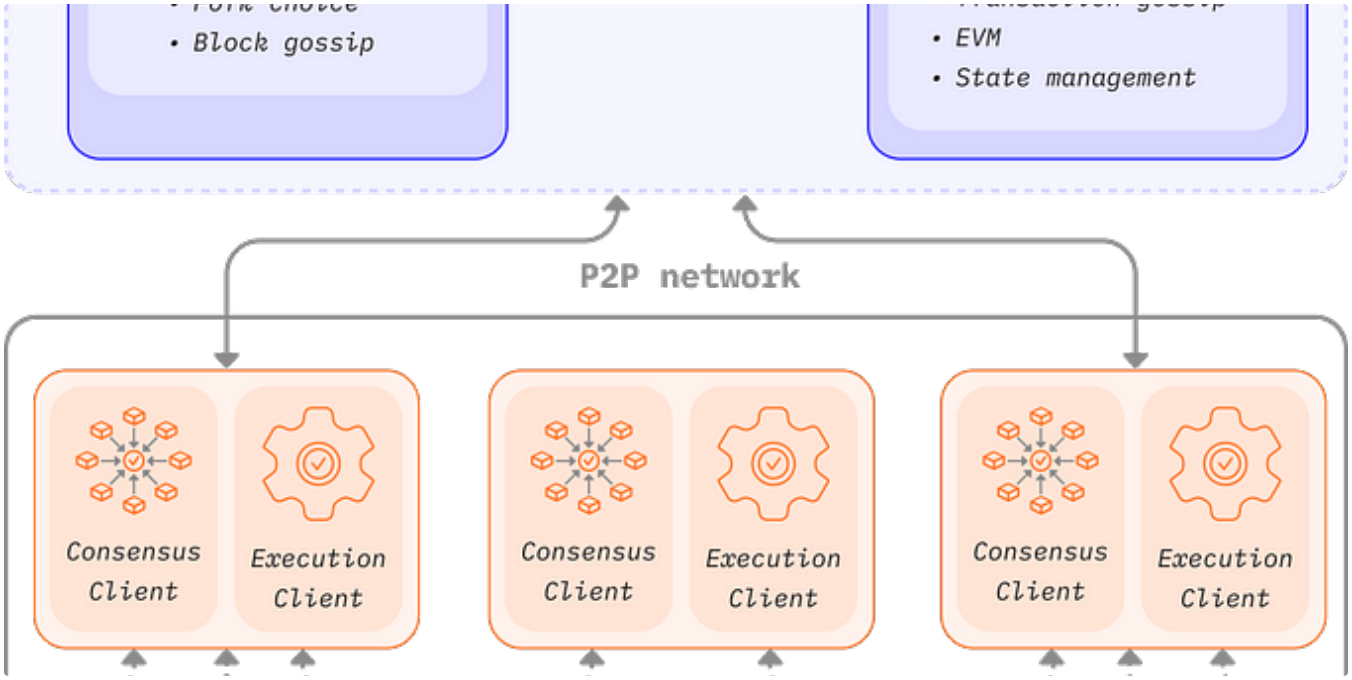

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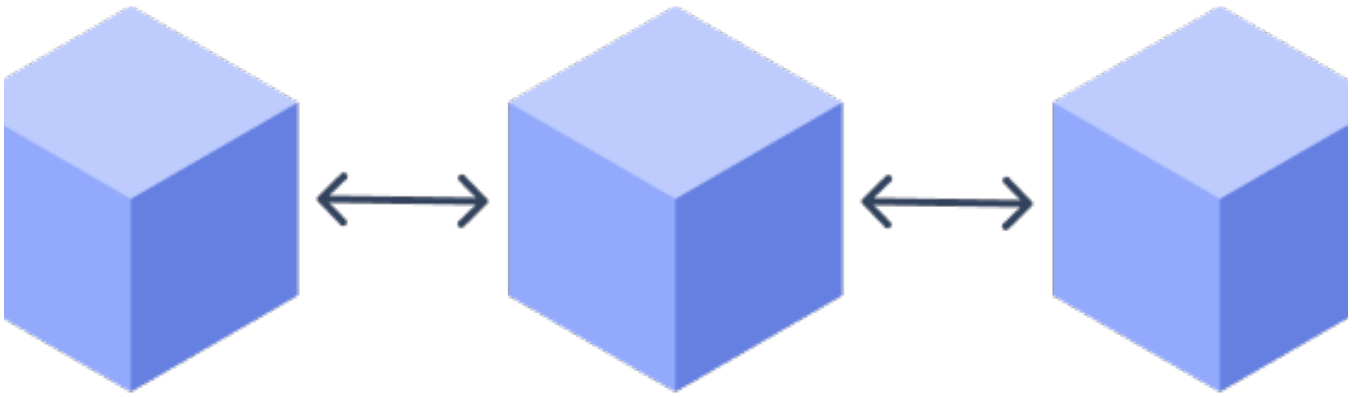

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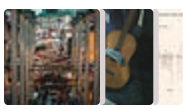

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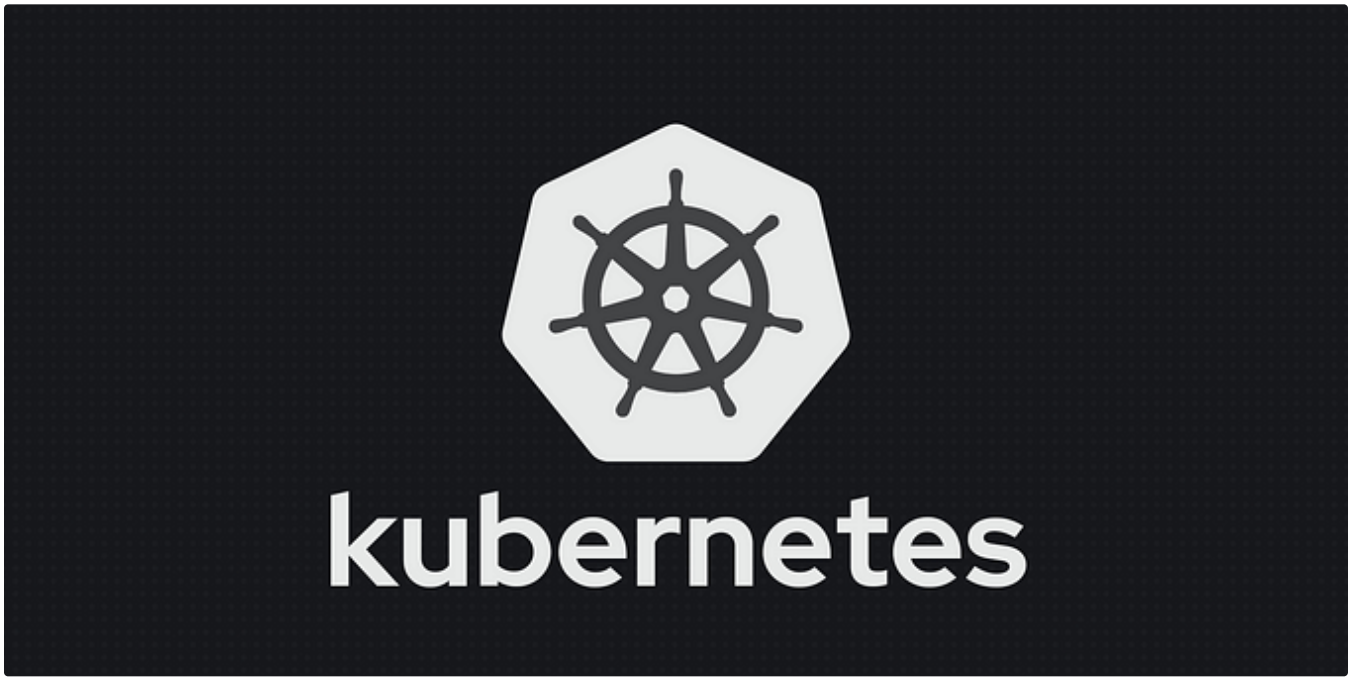

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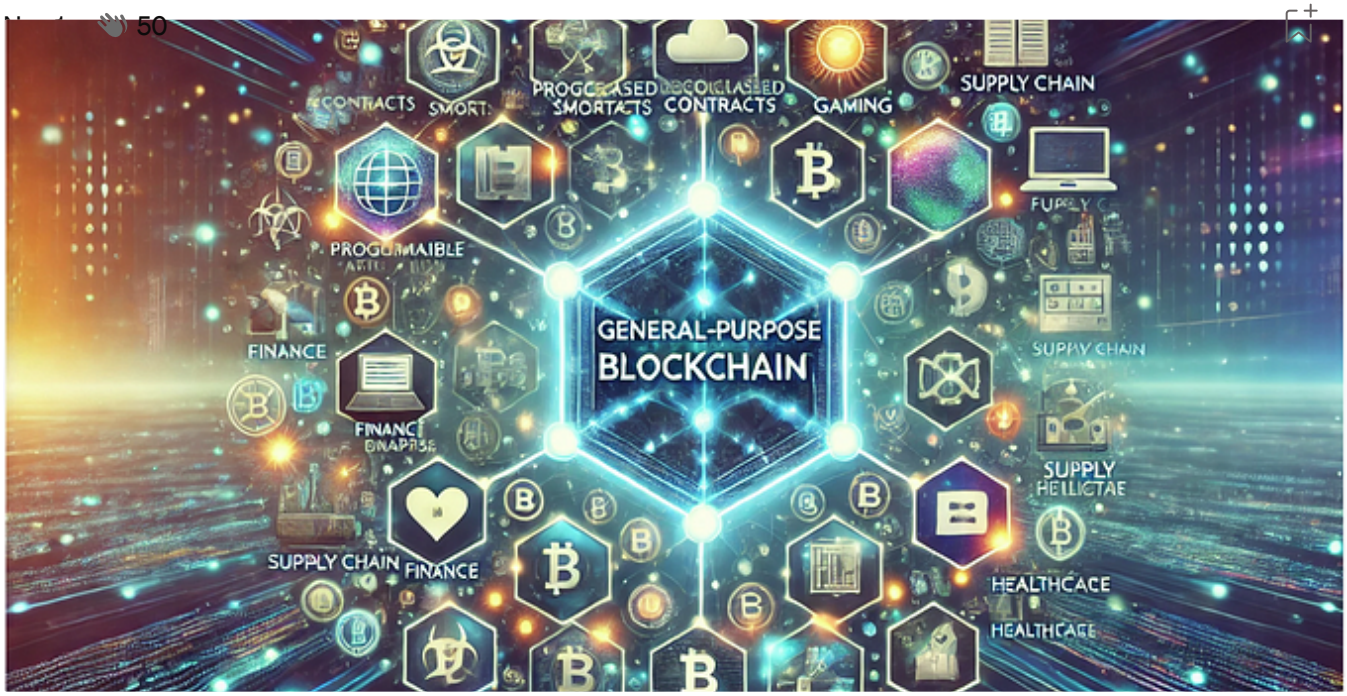

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