Digital assets
April 6, 2022
Web3 applications are built on top of 3 technology primitives: Blockchain, Smart Contracts & Digital Assets

Web3 Applications
- DeFi
- Gaming
- Art
- Media

Web3 Primitives
1. Blockchain
   - Digitally distributed, decentralized, public ledger that exists across a network and facilitates the recording of transactions

2. Smart Contracts
   - Code or programs stored on a blockchain that execute when conditions are met (e.g., terms between a buyer and a seller), governed by DAO

3. Digital Assets & Tokens
   - Assets that exist digitally, including cryptocurrencies, digital stocks, stablecoins, digital collectables, etc

Applications built on Web3 primitives that, in combination, can make up a metaverse

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2: Smart contracts

What is it?

A smart contract is a computer protocol intended to digitally facilitate, verify, or enforce the negotiation or performance of a contract

- Smart contracts are written as code and stored on the blockchain; the code and its conditions are publicly available on the ledger
- An event triggers the execution of coded terms in the contract (e.g., target price reached, date expired)
- Assets are released to the necessary parties, both parties remain anonymous throughout
- Regulators are able to review the immutable transaction records to understand and investigate activity

How do Smart Contracts work?

Bob wants to take out a loan
Bob sends collateral to back his loan (e.g., title of a house, tokenized stocks, Bitcoin)

Jane wants to earn interest on her funds
Jane sends tokenized cash (i.e., stablecoins) to provide liquidity for loans

Smart contract receives assets
Smart contract distributes assets

The smart contract can escrow the borrower’s collateral and the lender’s funds. The contract can also distribute the funds once sufficient collateral is deposited, or automatically liquidate the loan if the collateralization ratio is too low.

Distributed ledger to store loan information
Digitally store the record of loan information that Bob took against his collateral

Distributed ledger to settle funds
Distribution of the funds happens instantly as the blockchain ledger updates

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## 3: Digital assets & tokens

<table>
<thead>
<tr>
<th>Assets</th>
<th>Description</th>
<th>Bitcoin</th>
<th>Ether</th>
<th>Solana</th>
<th>Aave</th>
<th>Uniswap</th>
<th>Chainlink</th>
<th>USDC</th>
<th>USDT</th>
<th>Dai</th>
<th>Centrifuge</th>
<th>Securitize</th>
<th>Figure</th>
<th>Bored Ape Yacht Club</th>
<th>CryptoPunks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native tokens</td>
<td>Used to pay for (smart contract) transaction validation to the miner network (i.e., to add the transaction to the ledger). This token functions as the native reward currency paid to parties operating the nodes</td>
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<tr>
<td>Governance tokens</td>
<td>Governance tokens can be used to implement changes to smart contracts. Parties who own sufficient governance tokens can put up proposals; all parties with governance tokens can vote; votes are recorded on the blockchain</td>
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<tr>
<td>Stablecoins &amp; CBDCs</td>
<td>Stablecoins represent cash on the blockchain network, and provide liquidity to settle transactions in “cash-equivalent” units of value. They can be used to engage with smart contracts (in contrast to cash)</td>
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<tr>
<td>Tokenized assets</td>
<td>Tokenized assets can represent any real-world asset on the blockchain network (e.g., equities, bonds) so that they can interact with smart contracts (in contrast to plain digitized assets)</td>
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<tr>
<td>NFTs</td>
<td>Unique assets that can represent anything of value (e.g., digital media, art, gaming items, etc.). They are non-fungible (i.e., unique, specific properties); properties can be hard-coded in the contracts</td>
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New business models are enabled by 5 characteristics of the Web3 tech stack

<table>
<thead>
<tr>
<th>Characteristic</th>
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<tbody>
<tr>
<td>Decentralized</td>
<td>Ownership and operation is not controlled by a central entity, but distributed among a network of participants who independently operate and maintain the ledger</td>
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<tr>
<td>Permissionless</td>
<td>Users do not need permission from any central authority (e.g., by applying for an account) to read or write data or interact with the distributed ledger</td>
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<td>Trustless</td>
<td>No need for participants to trust each other or centralized institutions – trust is established by the open-source code and the resilience of the decentralized ledger</td>
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<td>Composable</td>
<td>Open-source code and protocols enables programs to freely interact and build on proven functionality, increasing the speed of innovation</td>
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<tr>
<td>Immutable</td>
<td>Once data is recorded or smart contracts are deployed to a distributed ledger it cannot be amended or adjusted, and is maintained indefinitely as a timestamped record</td>
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</tbody>
</table>

These fundamental technological characteristics underpin many of the advantages of Web3 businesses.
Web3 is enabling multiple applications of Decentralized Finance (DeFi)

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Banking</strong></td>
<td>Lending/borrowing – banks loans, interest earned on deposits</td>
</tr>
<tr>
<td><strong>Investing / Trading</strong></td>
<td>Stocks, bonds, derivatives via banks and brokers</td>
</tr>
<tr>
<td><strong>Payments</strong></td>
<td>Cash (fiat), bank transfer, credit cards</td>
</tr>
<tr>
<td><strong>Insurance</strong></td>
<td>Contract-based insurance</td>
</tr>
<tr>
<td><strong>Raising capital</strong></td>
<td>Initial Public Offerings, debt issuance, venture capital</td>
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<td></td>
<td>Lending protocols, yields earned on on-chain assets</td>
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<td>Digital assets (e.g., tokenized bonds, crypto) via decentralized exchanges and OTC desks; yield earned via liquidity provisioning in AMMs</td>
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<td>Stablecoins (e.g., fully reserved, algorithmic) and certain cryptocurrencies (e.g., BTC)</td>
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<tr>
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<td>Smart contract-based automatic insurance protocols</td>
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<td>Price discovery via token offerings (e.g., Liquidity Bootstrapping Pool), Security Token Offerings (STOs)</td>
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</tbody>
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Advantages of DeFi

**Cost:** Significantly lower overhead allows users to capture greater value (e.g., higher yields)

**Accessibility:** Global, permissionless, 24/7 access reduces consumer friction

**Composability:** New use cases can very quickly emerge by combining various open-source code projects
DeFi example: banking applications

Illustrative  Non-exhaustive

Web 2 bank: the model we all know

- Depositors
- Borrowers
- Service
  - Private Ledger
  - Deposits & Loans
- Corporation
  - Management
  - Shareholders

Web 3 bank: Decentralized deposit and lending pools

- Deposits (Lenders)
- Borrowers
- Blockchain
- Ethereum Network
- dApp (smart contract)
- Governance
  - DAO
    - Management
    - Token Holders

Data, Capital  Interest payment

Interest payments  Digital Assets

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DeFi saw significant growth in 2021

More capital is allocated to decentralized finance to generate yield every month

Volumes of transaction activity in decentralized finance are becoming significant

- **~2T USD**
  Volume of on-chain stablecoin transactions per quarter, 2021

- **>1T USD**
  Volume on decentralized exchanges

- **>200B USD**
  Value of loans taken out on decentralized lending platforms

- **10-100%**
  Yield generated on locked assets (incl. stablecoins)

Source: Coingecko, DeFiLama

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### Types of digital assets

<table>
<thead>
<tr>
<th>Type of Digital Asset</th>
<th>Examples of Use Cases</th>
<th>Open Questions</th>
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</thead>
</table>
| **Fully reserved stablecoin** issued on a public, permissionless blockchain | • Source of liquidity in DeFi lending protocols  
• Store of value within digital asset ecosystem (i.e., avoids needing to off-ramp)  
• Can be used to interact with smart contracts | Will regulation (e.g., audit schedules, reserve requirements) impact the value proposition of these stablecoins? |
| **Deposit-based stablecoin** issued on private bank-owned blockchain by an FDIC-insured entity | • Enable real-time fiat settlement of trades between permissioned participants (i.e., bank customers)  
• More efficient cross-border transactions (messaging and money movement) | How can banks drive adoption across the industry to get scale benefits?  
How can banks compete with public permissionless networks? |
| **Central bank digital currency** (wholesale), issued on a permissioned government blockchain | • Enable more precise, efficient and innovative implementation of monetary policy (e.g., negative interest rates, targeted stimulus injections)  
• Simplify financial services infrastructure | What is the value proposition of a CBDC to consumers and businesses (incremental to other stablecoins)? |
| **Cryptocurrency** unlinked from fiat with a floating value (e.g., Bitcoin, Ether) | • Used to pay for ledger changes (i.e., transaction validation to the miner network)  
• Store of value and inflation hedge due to limited supply (primarily BTC) | What role will digital assets play in the broader financial system (e.g., will central banks hold cryptocurrencies on their balance sheets)? |