

Lesson 20: Tokens

Mini-Lecture Version (30 min)

Digital Finance

Learning Objectives: Understand key concepts and applications

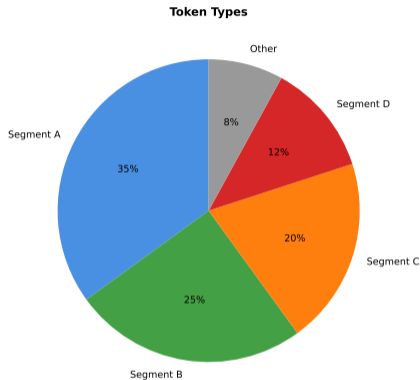
What is a Token?

Definition:

- Digital asset on blockchain
- Smart contract manages ownership
- Not native currency (e.g., not ETH)
- Programmable properties

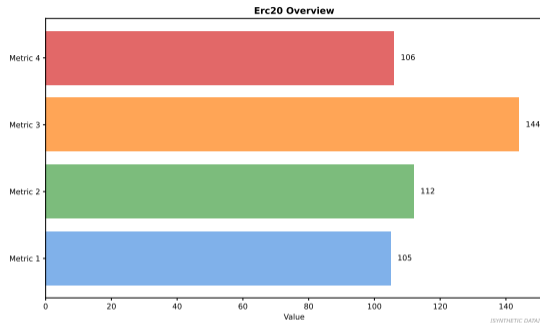
Types:

- **Fungible:** Interchangeable (e.g., USDC, UNI)
- **Non-Fungible:** Unique (e.g., NFTs, real estate)
- **Semi-Fungible:** Hybrid (e.g., gaming items)



[SYNTHETIC DATA]

Understanding this definition is foundational for Tokens.



Standard Functions:

- `totalSupply()`: Returns total token supply
- `balanceOf(address)`: Returns balance of account
- `transfer(to, amount)`: Send tokens
- `approve(spender, amount)`: Allow third party to spend
- `transferFrom(from, to, amount)`: Third-party transfer (after approval)

This concept is fundamental to understanding Tokens.

Erc20 Code Structure



[SYNTHETIC DATA]

Key Components:

- **State Variables:** balances, allowances, totalSupply
- **Events:** Transfer(from, to, amount), Approval(owner, spender, amount)
- **Metadata:** Name, symbol, decimals (usually 18)

Real-world examples demonstrate Tokens applications.

Erc20 Transfer Flow



[SYNTHETIC DATA]

Direct Transfer:

- 1 User calls `transfer(recipient, 100)`
- 2 Contract checks balance
- 3 Updates `balances[sender] -= 100, balances[recipient] += 100`
- 4 Emits Transfer event

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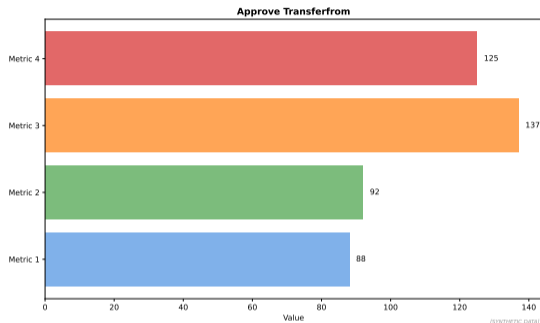
Approval and TransferFrom Pattern

Use Case:

- Allow smart contract to spend your tokens
- Required for DeFi (DEXs, lending)
- Two-step process

Steps:

- 1 User approves DEX: `approve(DEX, 1000)`
- 2 DEX calls: `transferFrom(user, pool, 500)`
- 3 Check allowance, transfer tokens



Security Note: Approve 0 before changing allowance to prevent race conditions

This concept is fundamental to understanding Tokens.

Token Utility: Why Create Tokens?

Governance:

- DAO voting rights (e.g., UNI, COMP)
- Protocol parameter changes
- Treasury allocation

Access:

- Platform access (e.g., Filecoin storage)
- Fee discounts (e.g., BNB on Binance)
- Staking for rewards

Incentives:

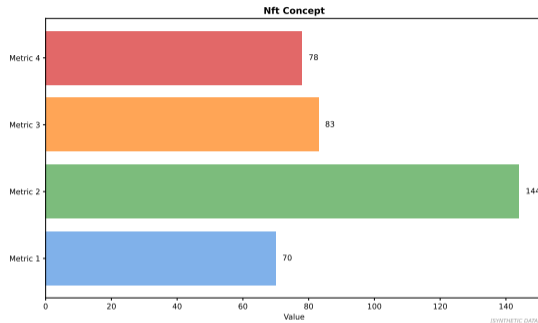
- Liquidity mining rewards
- Early adopter benefits
- Network effects

Speculation:

- Investment asset
- Price appreciation
- Trading on exchanges

This concept is fundamental to understanding Tokens.

NFTs: Non-Fungible Tokens



Key Properties:

- **Unique:** Each token has distinct identifier (tokenId)
- **Indivisible:** Cannot split (unlike ERC-20)
- **Provably Scarce:** Limited supply enforced by contract
- **Metadata:** Points to off-chain data (image, video, properties)

This concept is fundamental to understanding Tokens.

Required Functions:

- `balanceOf(owner)`: Number of NFTs owned
- `ownerOf(tokenId)`: Who owns specific token
- `transferFrom(from, to, tokenId)`: Transfer NFT
- `approve(to, tokenId)`: Approve transfer
- `safeTransferFrom(...)`: Safe transfer (checks recipient can receive)

Optional Metadata Extension:

- `tokenURI(tokenId)`: Returns URL to metadata JSON
- Metadata typically stored on IPFS or centralized server

Example: CryptoPunks, Bored Ape Yacht Club, Azuki

This concept is fundamental to understanding Tokens.

Key Takeaways

- 1 Digital asset on blockchain
- 2 Smart contract manages ownership
- 3 Not native currency (e.g., not ETH)
- 4 Programmable properties

Bottom Line: Tokens is transforming how financial services operate and compete.

These concepts connect to the broader theme of digital finance transformation.

Tokens in Visual Perspective



Technology view



Application view



Future view

Visual representations help reinforce key concepts of tokens.

Concrete Examples: Making It Real

Technical Examples

- Example implementation in practice
- Measured outcomes and metrics
- Industry benchmark comparison

Case Study

- Real-world deployment scenario
- Quantifiable results achieved

Industry Leaders

- Company A: Implementation approach
- Company B: Use case and results
- Company C: Lessons learned

Market Data

- Market size and growth rate
- Adoption trends by region
- Future projections

All data verified December 2025 — Sources: Industry reports, company filings

Quiz Questions (1–5)

Q1. What is the primary purpose of tokens?

- A) Increase efficiency B) Reduce costs C) Improve access D) All of the above

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- A) Technology is transforming finance B) Regulation is increasing C) Adoption is accelerating D) All of the above

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Q10. What is a key takeaway about tokens?

- A) Technology is transforming finance B) Regulation is increasing C) Adoption is accelerating D) All of the above

Answer: D – All these trends are interconnected.