

Ethereum ERC Token Standards

Educational Series

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What is Ethereum?

- **Ethereum** is a blockchain-based decentralized platform designed for running smart contracts. Smart contracts are pieces of code stored on the blockchain that can read and write data and are triggered by blockchain transactions.
- Smart contracts are important because they allow for the creation of decentralized applications (DApps) that can automate processes and run exactly as programmed with no possibility of censorship or downtime.
- The native currency for Ethereum is called **Ether (ETH)** and it powers the platform through transaction fees. However, one of the biggest features of Ethereum is the ability for anyone to create unique tokens that exist and operate on the Ethereum blockchain.



What does ERC mean?

- **ERC** is an acronym that stands for **Ethereum Request for Comments**. ERCs are application level standards for Ethereum and can include token standards, name registries, library/package formats, and more. Anyone can create an ERC, but it is the author's responsibility to clearly explain their standard and foster support for it within the community.
- We will focus on common ERC token standards and how they are different from each other. These standards define a required set of functions for a token type, allowing applications and smart contracts to interact with them in a predictable way.

ERC-20

- **ERC-20** is a token standard first proposed by Vitalik Buterin in June 2015. It is a simple interface that allows for the creation of tokens on Ethereum that can be re-used by other applications, from wallets to decentralized exchanges. It is also the most commonly used standard for Ethereum-based tokens and was the token of choice for many initial coin offerings (ICOs) between 2016-2018.
- The ERC-20 standard contains 6 key functions that must be implemented to meet the standard: `totalSupply()`, `balanceOf()`, `transfer()`, `transferFrom()`, `approve()`, `allowance()`.
- ERC-20 tokens are relatively easy to create – as of December 1, 2018*, there are 150,558 ERC-20 contracts deployed on the Ethereum blockchain. Some of the most valuable ERC-20 tokens include Binance Coin (BNB), 0x (ZRX), and OmiseGo (OMG) with market caps of \$678 million, \$231 million, and \$216 million, respectively.

ERC-721

- **ERC-721** is a token standard that defines non-fungible tokens (NFTs) on the Ethereum blockchain.
- Fungibility is a characteristic of a good or commodity whose individual units are identical and interchangeable. Like US dollars, ERC-20 tokens are also fungible.
- The ERC-721 standard was introduced to allow anyone to create tokens on Ethereum that are completely unique from one another. No two ERC-721 tokens are alike, and they can be thought of as one-of-a-kind collectables.

ERC-721 (continued)

- ERC-721 tokens can be used to represent ownership over assets, e.g. physical assets such as land, art, or property, and virtual assets like digital collectables.
- CryptoKitties is one project utilizing ERC-721 tokens. In the game, each kitty is represented by an ERC-721 token which means they are unique, can never be replicated, taken away, or destroyed.
- As of December 1, 2018*, there have been 481,000 sales of CryptoKitties totaling over \$27 million. The traffic on the dApp was enough to clog the entire Ethereum blockchain in late 2017, proving that digital collectables are a popular use case for ERC-721 tokens.



Other ERC standards

- **ERC 223** – A standard that defines a type of token similar to ERC-20 with added functionality. If ERC-20 tokens are sent to a smart contract not built to work with the ERC-20 standard, those tokens will be inaccessible forever. ERC-223 contains a method called tokenFallback that ensures tokens are only sent to contracts with the appropriate functionality.
- **ERC 777** – Another standard attempting to improve upon the ERC-20 token. It defines advanced features including operators to send tokens on behalf of another address and offers users more control over their tokens.

Other ERC standards (continued)

- **ERC 1155** – An interface that allows smart contracts to manage multiple token types. A deployed contract may include any combination of fungible tokens, non-fungible tokens, or other types (i.e. both ERC-20 and ERC-721).
- **ERC 1337** – A token standard for recurring subscriptions on the Ethereum blockchain. This standard focuses on interoperability, allowing wallets to sign into recurring payment contracts and providing appropriate UI for managing and cancelling subscriptions.

*Crush***Crypto**
