

IMD0913  
TOKENS

# Token

Representação de um ativo negociável.

# Tokens

É um ativo digital em um *blockchain* mas que não é a criptomoeda principal daquele *blockchain*  
ou seja, você não precisa criar um *blockchain* para criar um *token*

**Tokens** são similares ao ether: você pode enviar para outros endereços

Algumas classificações:

Tokens de pagamento: similar a criptomoeda

Tokens de *security*: representam um nível de investimento em um projeto

Tokens de utilidade: usados para interagir com um produto ou serviço

Tokens **fungíveis**: similares ao conceitos de criptomoedas (ex: nota de 10 reais)

Tokens **não fungíveis** (NFT): tokens “únicos” (ex: escritura de um imóvel)

# Tokens

Como *tokens* não tem seu próprio *blockchain*, por trás dos panos eles usam ***smart contracts***

Todo *token* disponível no blockchain do Ethereum tem seu próprio *smart contract*

Registram os donos dos *tokens* para aquele tipo de *token*

Como a EVM não sabe o que são *tokens*, a transação tem valor de 0 ETH

Endereço de destino e quantidade de *tokens* é especificada como dados de entrada (*input data*)

A transação é enviada para o contrato do *token*



Eth: \$221.43 (-7.29%)

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## Transaction Details

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Sponsored: AMFEIX - The World's First Smart Contract Trading Fund - Averaging 20% Compounded Returns Per Month since January.

Overview

Event Logs (1)

State Changes

New

Comments



Transaction Hash: 0xa3e2fc7ca6a3fd8071f6b23c6a4f70eb87eaa0dbb278cff722707e9fe2d63c16

Status: Success

Block: 7593651 562084 Block Confirmations

Timestamp: 87 days 17 hrs ago (Apr-18-2019 07:50:45 PM +UTC)

From: 0x0b9f45a8a01724f8a6e92beac3e2f4d949351a87

To: Contract 0x89d24a6b4ccb1b6faa2625fe562bdd9a23260359 (Dai Stablecoin)

Tokens Transferred: From 0x0b9f45a8a01724f... To 0x66aa8bee5366b6... For 25 (\$24.58) Dai Stableco... (DAI)

Value: 0 Ether (\$0.00) transfer(address dst, uint256 wad)

Transaction Fee: 0.000067086 Ether (\$0.01)

Click to see More ↓

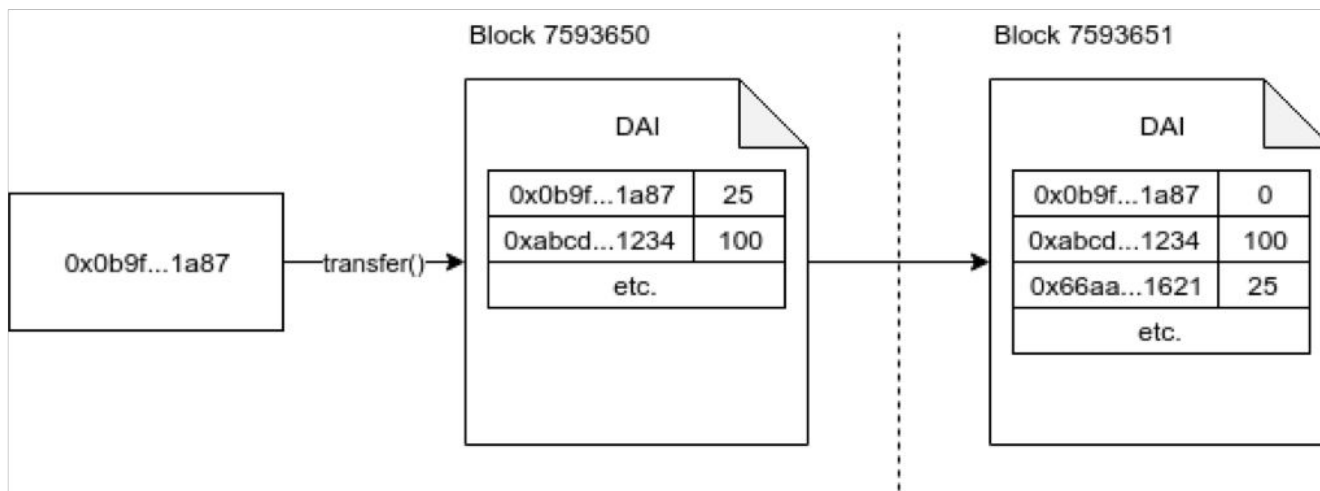
Private Note: To access the Private Note feature, you must be Logged In

# Tokens

0x0b9f...1a87

transfer(0x66aa...1621, 25)

```
315     }  
316  
317     function transfer(address dst, uint wad) public returns (bool) {  
318         return transferFrom(msg.sender, dst, wad);  
319     }  
320  
321     function transferFrom(address src, address dst, uint wad)  
322         public  
323         returns (bool)
```








Token Tracker ERC-20

ERC-20 Tokens Search

A total of 702,911 Token Contracts found

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#	Token	Price	Change (%)	Volume (24H)	Circulating Market Cap	On-Chain Market Cap	Holders
1	 <b>Tether USD (USDT)</b> Tether gives you the joint benefits of open blockchain technology and traditional currency by converting your cash into a stable digital currency equivalent.	<b>\$0.9983</b> 0.000060 Btc 0.000856 Eth	▼ -0.28%	\$39,949,961,172.00	\$65,434,363,539.00	\$39,757,371,874.14	4,470,497 ▼ -0.007%
2	 <b>BNB (BNB)</b> Binance aims to build a world-class crypto exchange, powering the future of crypto finance.	<b>\$293.6367</b> 0.017716 Btc 0.251899 Eth	▲ 15.59%	\$1,515,022,981.00	\$46,973,749,375.00	\$4,868,354,081.68	314,126 ▲ 0.000%
3	 <b>USD Coin (USDC)</b> USDC is a fully collateralized US Dollar stablecoin developed by CENTRE, the open source project with Circle being the first of several forthcoming issuers.	<b>\$0.9987</b> 0.000060 Btc 0.000857 Eth	▼ -0.50%	\$3,508,365,629.00	\$44,145,246,865.00	\$46,539,890,377.81	1,524,913 ▼ -0.022%
4	 <b>Binance USD (BUSD)</b> Binance USD (BUSD) is a dollar-backed stablecoin issued and custodied by Paxos Trust Company, and regulated by the New York State Department of Financial Services. BUSD is available directly for sale 1:1 with USD on Paxos.com and will be listed for trading on Binance.	<b>\$1.001</b> 0.000060 Btc 0.000859 Eth	▼ -0.26%	\$9,565,647,900.00	\$22,769,312,223.00	\$17,592,669,900.81	158,180 ▲ 0.042%
5	 <b>Matic Token (MATIC)</b> Matic Network brings	<b>\$0.8605</b> 0.000052 Btc	▲ 6.73%	\$663,334,122.00	\$7,516,127,428.00	\$8,605,283,068.06	538,982 ▲ 0.087%

# Como *tokens* são criados?

Processo de ***minting*** é feito realizando o *deploy* de um contrato no *blockchain* do Ethereum

Um dos métodos mais comuns de distribuir tokens é a partir de sua venda, também conhecido como **ICO** (*Icon Coin Offering*)

Basicamente um *crowdfunding* para moedas/tokens

Alguns contratos tem funções para criação de tokens:

```
function mint(address _to, uint256 _amount) public {  
    require(msg.sender == owner);  
    balances[_to] += amount;  
    supply += amount;  
    emit Transfer(address(0), _to, _amount);  
}
```



# NFT - Token não fungível

**Token não fungível (NFT)** é único, ou seja, **1 token** não tem o mesmo "valor" que outro

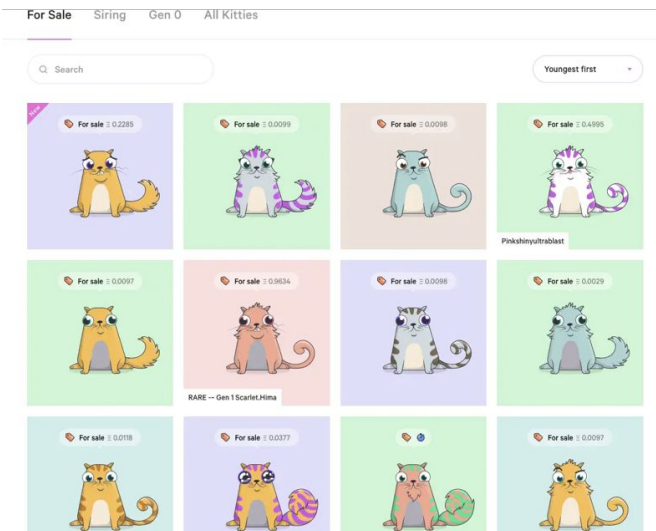
Alguns *tokens* valem mais que outros


Pense em cartas colecionáveis!

Exemplo notável: **Cryptokitties**! Se lembra?

Alguns gatinhos valem mais que outros apesar de que cada gatinho é um *token*

Simples de implementar!



Etherscan

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Q

Eth: \$1,175.13 (+7.70%) | 12 Gwei

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Non-Fungible Token Tracker

ERC-721

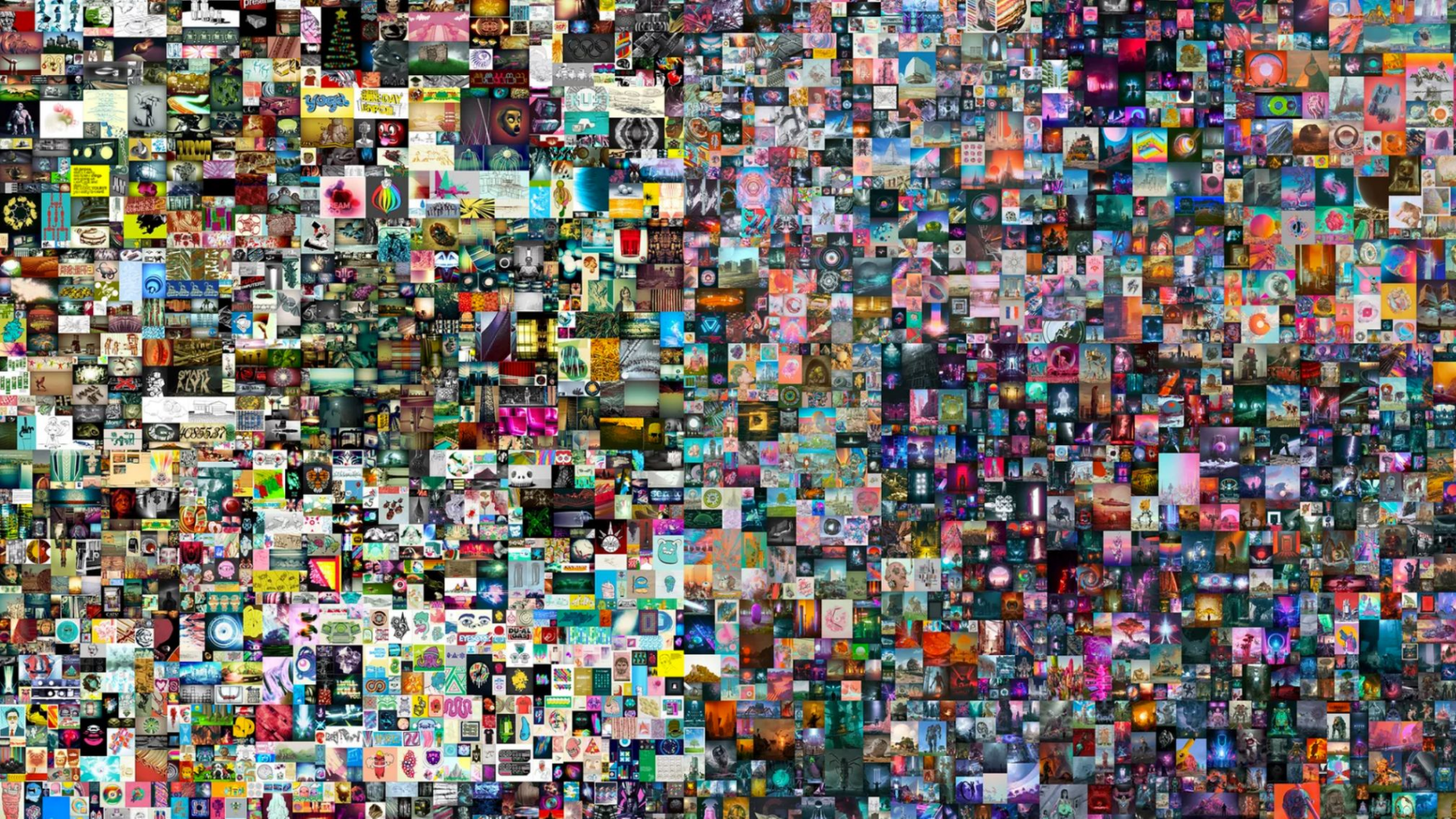
Non-Fungible Tokens (NFT)Q

A total of 172,938 ERC-721 Token Contracts found  
(Showing the last 100k records)

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#	Token	Transfers (24H)	Transfers (3D)
1	 <a href="#">Valhalla</a> Valhalla is a crypto native brand for gamers. Valhalla represent more than a collection of digital avatars. It represents decades of gaming culture: the clutch plays, the ELO grind, the OT wins. Purchasing one of our avatars grants you access to our exclusive community of gaming enthusiasts and...	12,165	12,165
2	 <a href="#">ShamanzV2</a>	10,407	15,613
3	 <a href="#">Agoria {Comp-nd} x [ L ] Market</a>	10,083	10,083
4	 <a href="#">Fragments of the Bear Market</a>	9,999	9,999
5	 <a href="#">Cel Apes</a> Apes escaped the warden's wrath and are running wild on the blockchain!	9,442	9,493
6	 <a href="#">otherfield</a>	7,953	7,953
7	 <a href="#">Ethereum Name Service (ENS)</a> ENS offers a secure & decentralised way to address resources both on and off the blockchain using simple, human-readable names.	7,891	22,038
8	 <a href="#">Bored y00ts Ape Club</a>	7,405	17,571
9	 <a href="#">PixieVixens</a>	7,216	7,216
10	 <a href="#">Lofi Originals 3D</a>	5,564	5,564
11	 <a href="#">Bored Valhalla Yacht Club</a>	5,256	5,256
12	 <a href="#">Recovery Punk</a>	4,489	4,489
13	 <a href="#">Antimatter Energy</a>	4,119	4,300
14	 <a href="#">LZD7 by VividLimited</a>	3,937	3,937









A dense, colorful mosaic of small, irregular shapes and patterns, resembling a complex, abstract artwork or a highly detailed, multi-colored fabric. The composition is a chaotic yet harmonious blend of various colors, including reds, blues, greens, yellows, and purples, creating a vibrant, textured surface. The individual elements are small and varied, contributing to an overall sense of depth and complexity.



1.4K 527 [Copy link to Tweet](#)



A large, dense mosaic composed of thousands of small, colorful photographs. The images are tightly packed together, creating a complex, abstract pattern of various colors and shapes. The overall effect is a vibrant, textured surface that changes as the viewer's perspective shifts.

12:24 PM - Mar 11, 2021 - SocialFlow



CRYPTOCURREN

## 91 〰

By [Jacob Kastrenakes](#) | [@jake\\_k](#) | Mar 11, 2021, 10:09am EST

 **beeples** ✓  
@beeples

12:42 PM · Mar 11, 2021

 60.6K
  7.7K
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Overview **Logs (1)** State Comments

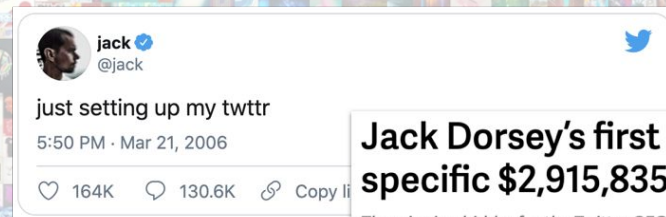
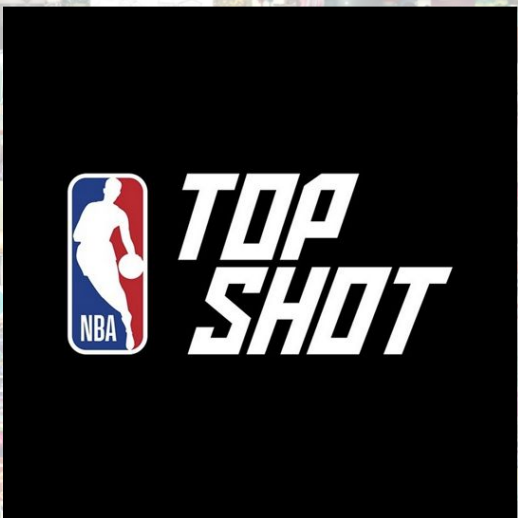
Transaction Receipt Event Logs

Address 0x244f0910be19a8b3476e2922790ca350a0750 [↗](#)

Name Transfer [index\_topic\_1, address\_from, index\_topic\_2, address\_to, uint256\_tokenId] View Source

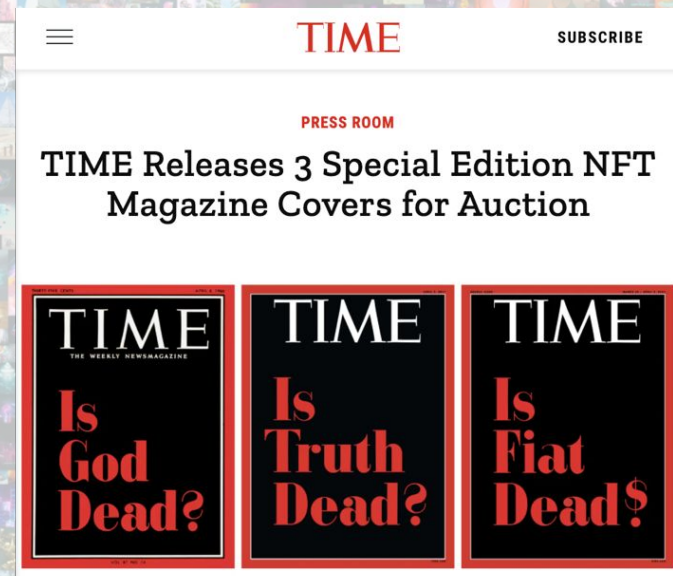
Topic	0	1	2	3
0	0xd4d7252ad16c2b0969c2b068f3c78ba4952ba7f13ca41628755a4df523b3f			
1	Dec =	0xc6a85626e05c35ee710138402b078ff6cf2c23807		
2	Dec =	0x58b1f126a0ca9596f7c0d07f346423d7d180c5351a		
3				

Data \_tokenId 40913



**Jack Dorsey's first tweet sold as an NFT for an oddly specific \$2,915,835.47**

The winning bidder for the Twitter CEO's first tweet was Sina Estavi



# Padrões de *tokens*

Você pode construir seu contrato para gerenciar seus *tokens* de qualquer maneira, mas é interessante **seguir um padrão definido**

O mais popular para tokens **fungíveis** é o padrão **ERC20**

O mais popular para tokens **não-fungíveis** é o padrão **ERC721**





# ERC20 - tokens fungíveis

Um contrato ERC20 deve prover pelo menos as seguintes funções e eventos:

**totalSupply** `function totalSupply() constant returns (uint theTotalSupply)`

Retorna o total de unidades deste *token* que existe atualmente. Tokens ERC20 podem ter quantidade fixa ou variável.

**balanceOf** `function balanceOf(address _owner) constant returns (uint balance)`

Dado um endereço, retorna o saldo de *tokens* deste endereço.

**transfer** `function transfer(address _to, uint _value) returns (bool success)`

Dado um endereço e uma quantidade, transfere aquela quantidade de *tokens* para o endereço, a partir do saldo do endereço que executou a função.

**transferFrom** `function transferFrom(address _from, address _to, uint _value) returns (bool success)`

Dado um remetente, destinatário e quantidade, transfere *tokens* de uma conta para outra. Usado em combinação com a função **approve**.

# ERC20 - tokens fungíveis

Um contrato ERC20 deve prover pelo menos as seguintes funções e eventos:

**approve** `function approve(address _spender, uint _value) returns (bool success)`

Dado um endereço de destino e quantidade, autoriza aquele endereço a executar diversas transferências até a quantidade definida, a partir da conta que emitiu a aprovação.

**allowance** `function allowance(address _owner, address _spender) constant returns (uint remaining)`

Dado o endereço do dono e um endereço emissor, retorna a quantidade restante que este emissor está autorizado a gastar.

**Transfer** `event Transfer(address indexed _from, address indexed _to, uint _value)`

Evento disparado a partir de uma transferência bem sucedida (**transfer** ou **transferFrom**).

**Approve** `event Approval(address indexed _owner, address indexed _spender, uint _value)`

Evento disparado a partir de uma chamada **approve** bem sucedida.



# ERC20 - tokens fungíveis

```
function totalSupply() constant returns (uint theTotalSupply);  
function balanceOf(address _owner) constant returns (uint balance);  
function transfer(address _to, uint _value) returns (bool success);  
function transferFrom(address _from, address _to, uint _value) returns (bool success);  
function approve(address _spender, uint _value) returns (bool success);  
function allowance(address _owner, address _spender) constant returns (uint remaining);  
event Transfer(address indexed _from, address indexed _to, uint _value);  
event Approval(address indexed _owner, address indexed _spender, uint _value);
```

Especificação da interface ERC20 em Solidity

<https://github.com/ethereum/EIPs/issues/20>

<https://eips.ethereum.org/EIPS/eip-20>

# ERC20 - tokens fungíveis

```
mapping(address => uint256) balances;  
mapping (address => mapping (address => uint256)) public allowed;
```

Especificação da interface ERC20 em Solidity

<https://github.com/ethereum/EIPs/issues/20>

# ERC20 - tokens fungíveis

```
string public constant name = "Nome do Token";  
string public constant symbol = "SYM";  
uint8 public constant decimals = 18;
```

Especificação da interface ERC20 em Solidity

<https://github.com/ethereum/EIPs/issues/20>

# ERC20 - Open Zeppelin



```
pragma solidity ^0.7.0;
import 'openzeppelin-solidity/contracts/token/ERC20/ERC20.sol';

contract MeuToken is ERC20 {
    string public name = 'MeuToken';
    string public symbol = 'MTK';
    uint8 public decimals = 0;
    uint constant public INITIAL_SUPPLY = 1000000;

    constructor() public {
        _mint(msg.sender, INITIAL_SUPPLY); // Gerando tokens iniciais.
    }
}
```

<https://openzeppelin.com/>

<https://github.com/OpenZeppelin/openzeppelin-contracts>

# ERC721 - tokens não fungíveis

```
function balanceOf(address _owner) external view returns (uint256);
function ownerOf(uint256 _tokenId) external view returns (address);
function safeTransferFrom(address _from, address _to, uint256 _tokenId, bytes data) external payable;
function safeTransferFrom(address _from, address _to, uint256 _tokenId) external payable;
function transferFrom(address _from, address _to, uint256 _tokenId) external payable;
function approve(address _approved, uint256 _tokenId) external payable;
function setApprovalForAll(address _operator, bool _approved) external;
function getApproved(uint256 _tokenId) external view returns (address);
function isApprovedForAll(address _owner, address _operator) external view returns (bool);

event Transfer(address indexed _from, address indexed _to, uint256 indexed _tokenId);
event Approval(address indexed _owner, address indexed _approved, uint256 indexed _tokenId);
event ApprovalForAll(address indexed _owner, address indexed _operator, bool _approved);
```

Especificação da interface ERC721 em Solidity

<https://ethereum.org/en/developers/docs/standards/tokens/erc-721/>

<https://docs.openzeppelin.com/contracts/3.x/erc721> (OpenZepellin)

