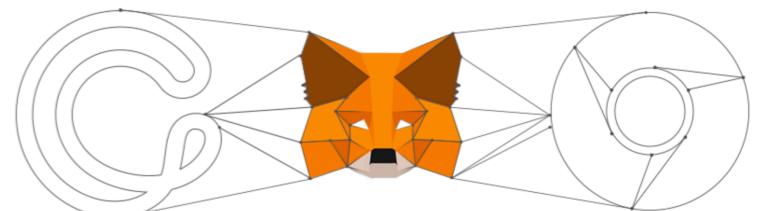


Install MetaMask

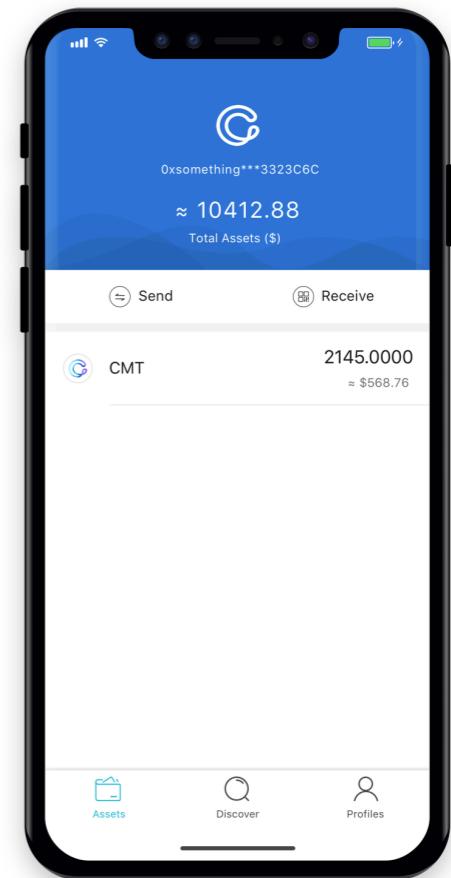
MetaMask For CMT: <https://www.cybermiles.io/metamask/>



Brings CyberMiles to your browser

Install CMT Wallet

CMT Wallet: <https://www.cybermiles.io/cmt-wallet/>



Remix for CMT

Remix CMT: <http://remix.cybermiles.io/#version= builtin>

ERC721



Kitty 2641



Kitty 2640

Smart Contract 103

Zhun Shen, CyberMiles

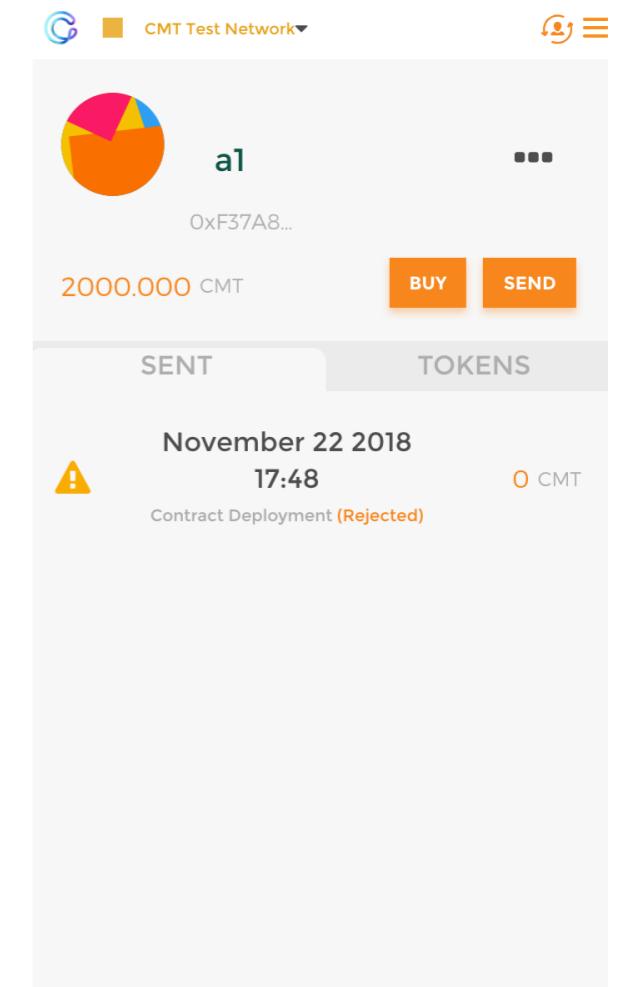
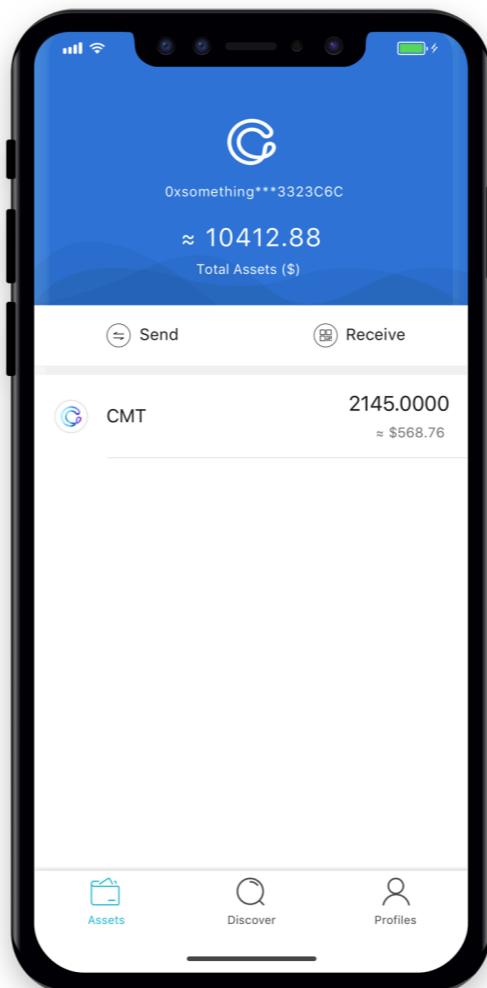
Agenda

- Introduction of Smart Contract and DApp
- Warm-up: Hello World & Remix How-to
- ERC-721
- Create your own ERC721 Token
- Game: Biding a Painting
- QA

Introduction

Wallet

- CMT Wallet
- MetaMask
- imToken
- MyEtherWallet
- ...



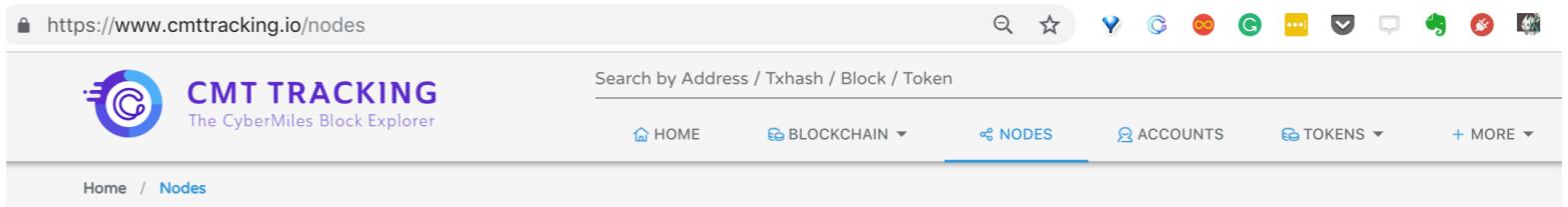
Gas



To run an application on Ethereum
YOU NEED GAS

Validator Nodes

- Validator
- Delegator



The screenshot shows a web browser displaying the CMT Tracking website at <https://www.cmtracking.io/nodes>. The page title is "CMT TRACKING The CyberMiles Block Explorer". The navigation bar includes links for HOME, BLOCKCHAIN, NODES (which is underlined), ACCOUNTS, TOKENS, and MORE. Below the navigation is a search bar labeled "Search by Address / Txhash / Block / Token". The main content area is titled "Nodes" and displays a table of 21 validator nodes. The columns in the table are: Name, Voting Power, Rank, Owner Address, Verified, State, Location, Total Stakes, and Compensation. The data in the table is as follows:

Name	Voting Power	Rank	Owner Address	Verified	State	Location	Total Stakes	Compensation
Huobipool	6034201	1	0x64832de9...	Y	Validator	Beijing, China	18,697,488.86	50.00%
CyberMiles Vietnam	5950500	2	0x1b92c5bb...	Y	Validator	Sai Gon Vietnam	20,601,067.49	45.00%
SSnodes	5630576	3	0x55249a08...	Y	Validator	Shenzhen, China	26,777,865.44	30.00%
Kryptial Group	5066131	4	0x221507f2...	Y	Validator	Cayman Islands	25,456,251.53	40.00%
Noomi	3035192	5	0x70a52ff3...	Y	Validator	Malta	14,608,138.23	50.00%
Block Wonderland	2454528	6	0x858578e8...	Y	Validator	Osaka, Japan	14,269,031.43	20.00%
ArcBlock	2384371	7	0x9a3482fd...	Y	Validator	USA	7,579,880.38	50.00%
Hayek Capital	1774122	8	0x1724d4a8...	Y	Validator	Australia	7,977,886.07	50.00%
Wancloud	1613367	9	0x3af427d0...	Y	Validator	Shanghai, China	6,925,879.40	40.00%
Lvl99	1475966	10	0xcd3090e8...	Y	Validator	Jakarta, Indonesia	4,515,970.09	50.00%
COBINHOOD	1084823	11	0x89586183...	Y	Validator	Taipei, Taiwan	3,686,767.06	50.00%
TGL Capital	826364	12	0x1ac7d4f1...	Y	Validator	Beijing China	2,701,550.19	50.00%
Moon Fund	822574	13	0xeb65290b...	Y	Validator	San Francisco, USA	2,666,735.34	55.00%
Snow Eagle Group Limited	745698	14	0x0da518ec...	Y	Validator	Israel	2,470,486.03	50.00%
Hash Tower	683041	15	0xfd0e8e4c...	Y	Validator	Seoul, South Korea	2,271,780.86	50.00%
Portland Master Limited	608516	16	0x4cdaf011...	Y	Validator	Hong Kong	2,233,436.80	50.00%
LiMaGo	570972	17	0xf9a43166...	Y	Validator	Taipei Taiwan	2,167,319.76	50.00%
Ellipal	564415	18	0x77f05c29...	Y	Validator	Hongkong,China	5,743,397.18	20.00%
Seed Backup Validator	149494	19	0xe2185094...	Y	Validator	HK	508,794.86	99.00%
Seed Backup Validator	139561	20	0x04ba6cf9...	Y	Backup Validator	HK	474,990.54	99.00%
Cobo Validator	134508	21	0x73879b18...	N	Backup Validator	Beijing, China	544,234.89	50.00%

<https://www.cmtracking.io/>

DApp

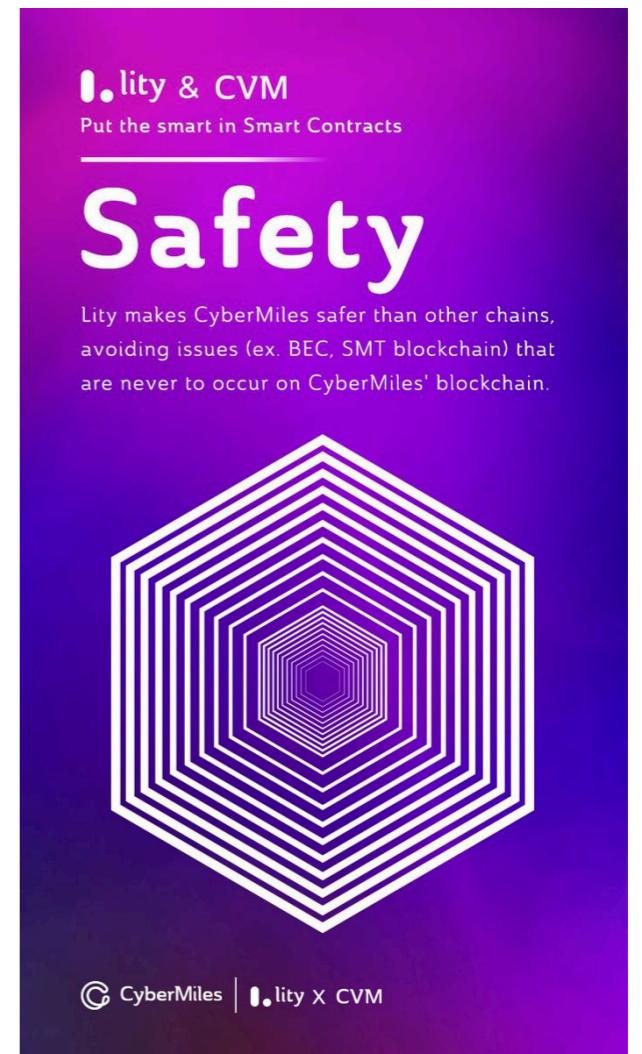


What is CryptoKitties?

CryptoKitties is a game centered around breedable, collectible, and oh-so-adorable creatures we call CryptoKitties! Each cat is one-of-a-kind and 100% owned by you; it cannot be replicated, taken away, or destroyed.

Language & Compiler

- Lity (powerful)
- Solidity
- ...



<https://www.litylang.org/>

Consensus Mechanism

- Proof of Work (POW)
- Delegated Proof of Stake (DPOS)
- ...

Warm-up

Hello World

33 lines (25 sloc) | 694 Bytes

```
1 pragma lity ^1.2.4;
2
3 contract HelloWorld {
4
5     mapping(address => string) userMessage;
6     address public owner;
7
8     modifier onlyOwner() {
9         assert(msg.sender == owner);
10        _;
11    }
12
13    constructor () public {
14        userMessage[msg.sender] = "Hello world";
15        owner = msg.sender;
16    }
17
18    function updateMessage (string _new_msg) public {
19        userMessage[msg.sender] = _new_msg;
20    }
21
22    function sayHello() public view returns (string) {
23        return userMessage[msg.sender];
24    }
25
26    function sayHelloByAddress(address addr) public view returns (string) {
27        return userMessage[addr];
28    }
29
30    function terminate() external onlyOwner {
31        selfdestruct(owner);
32    }
33 }
```

ERC-721

What's ERC721(NFT)?

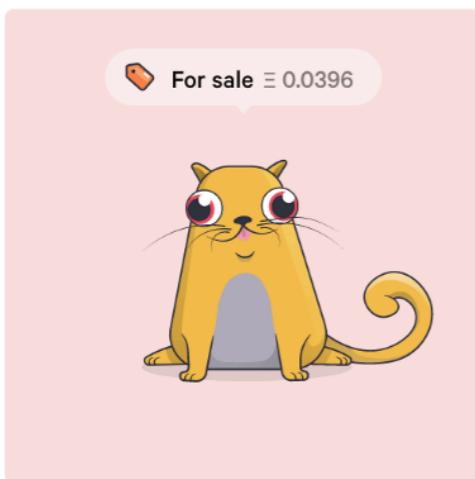
The screenshot shows a GitHub repository page for the Ethereum/EIPs repository. The repository name is "ethereum / EIPs" with a green checkmark. The main navigation tabs are "Code", "Issues 333", "Pull requests 96", "Releases", and "More". The "Issues" tab is selected. The specific issue shown is titled "ERC: Non-fungible Token Standard #721". It is labeled as "Open" and was created by "dete" on Sep 23, 2017, with 365 comments. A "New issue" button is visible. The issue content discusses the acceptance and merging of the proposal as a draft standard, pointing to the "officially tracked version". It also mentions PR #841 and thread #721 for further discussion. Below the content are sections for "Assignees" (No one assigned), "Labels" (None yet), "Projects" (None yet), and "Milestone" (No milestone). At the bottom of the issue view are social sharing icons and a footer with GitHub links.

<https://github.com/ethereum/eips/issues/721>

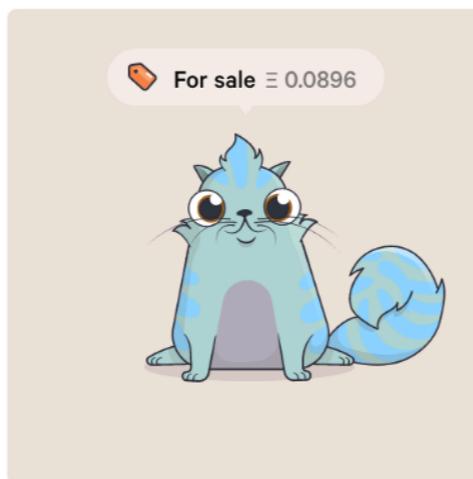
ERC20: Money



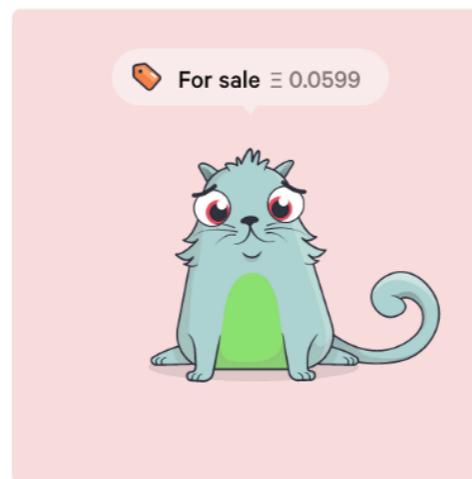
ERC721: CryptoKitties



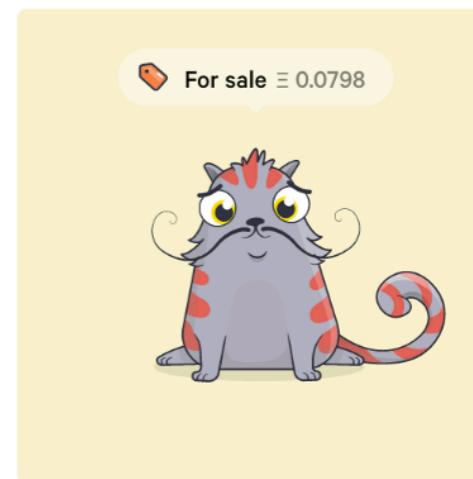
Kitty 240616 · Gen 8
Snappy



Kitty 240611 · Gen 4
Swift



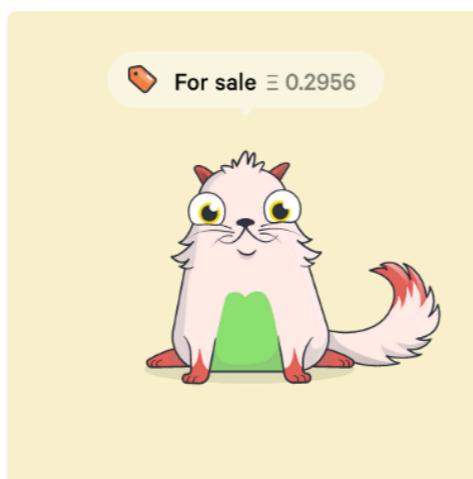
Kitty 240609 · Gen 7
Snappy



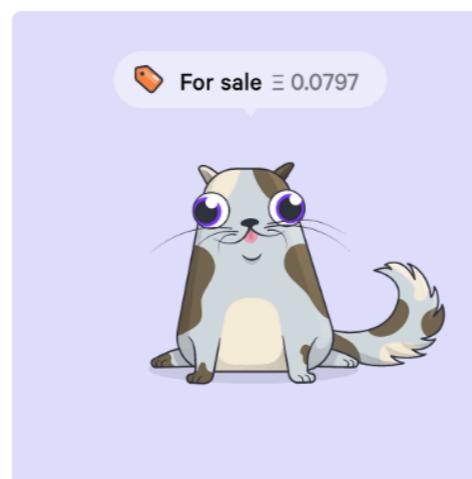
Kitty 240603 · Gen 7
Snappy



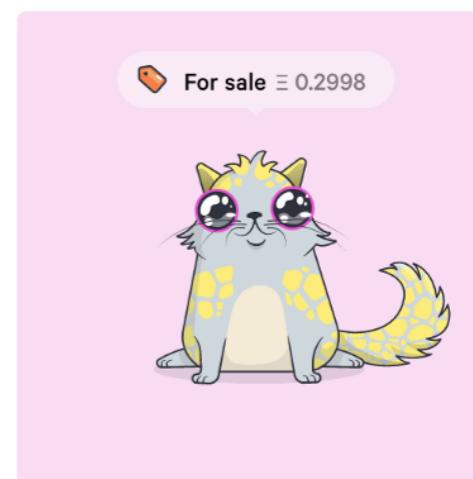
Kitty 240601 · Gen 9
Snappy



Kitty 240570 · Gen 7
Snappy

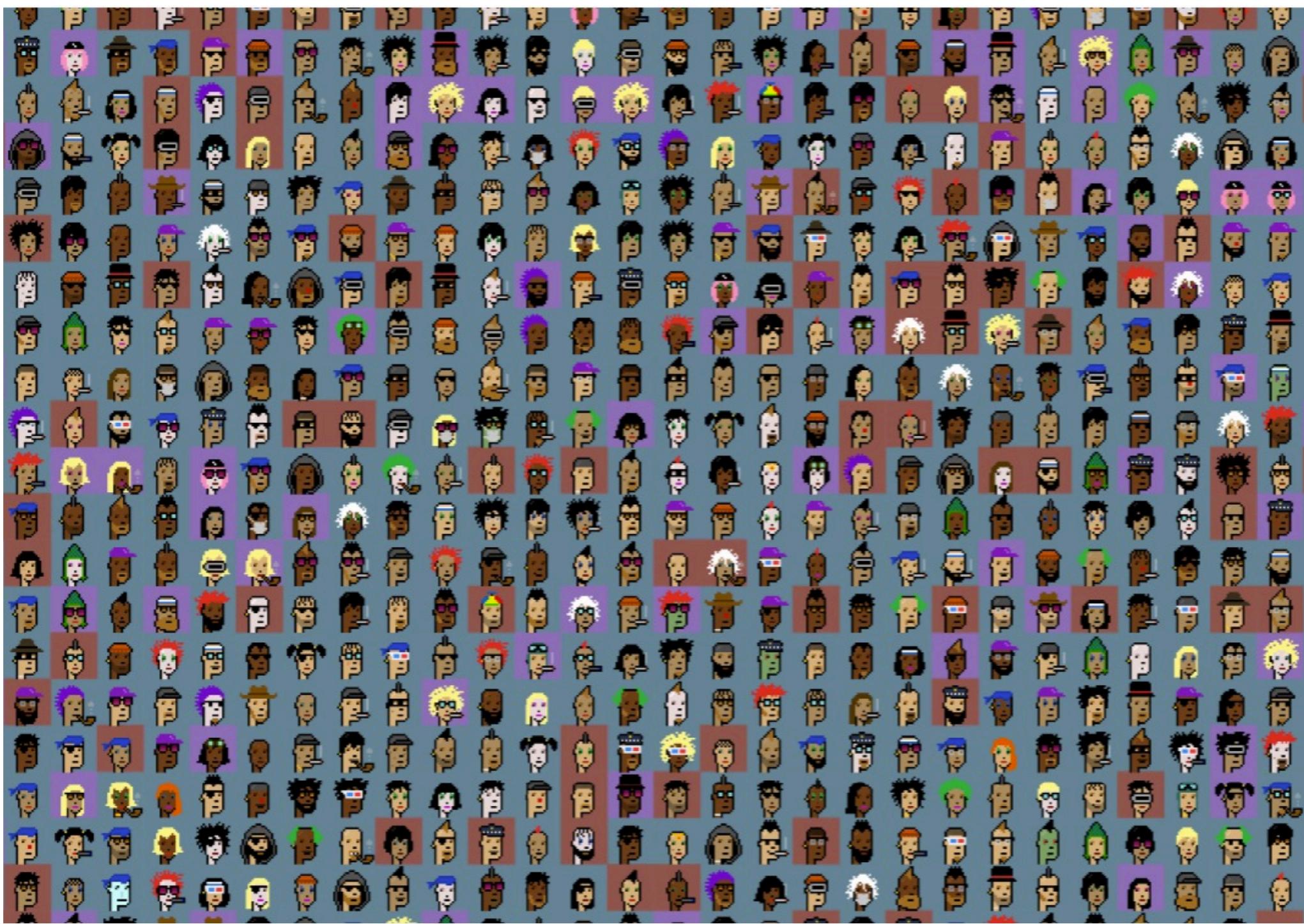


Kitty 240568 · Gen 15
Plodding

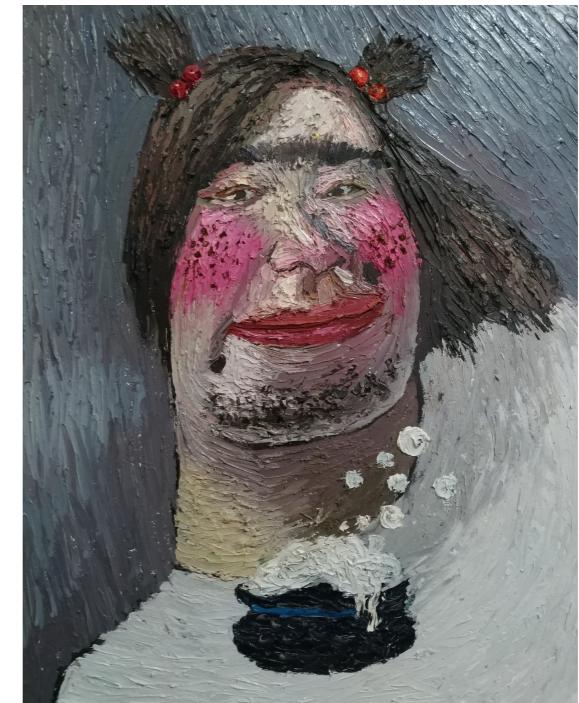
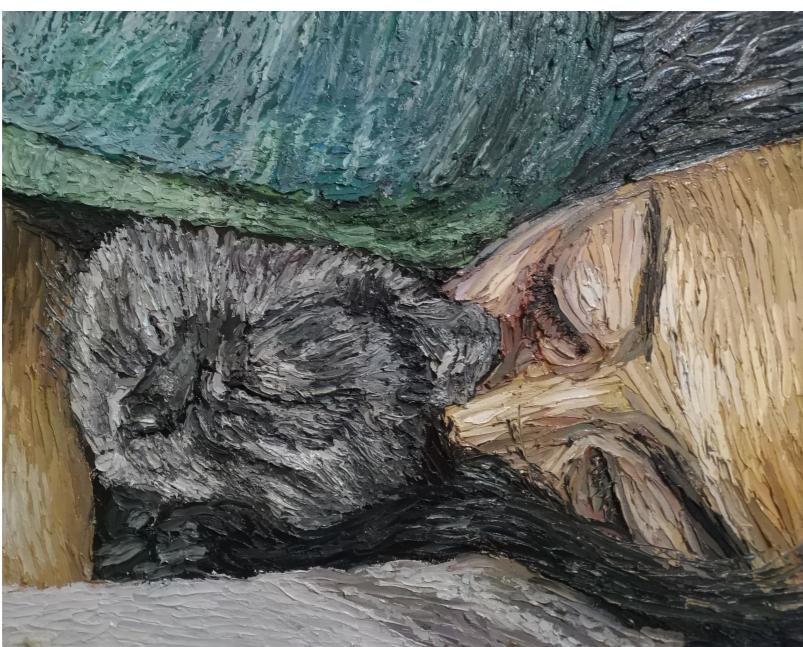


Kitty 240560 · Gen 9
Snappy

ERC721: CryptoPunks



ERC721: Painting



Let's create your own NFTs

Methods

MyNFT at 0x7d9...ca498 (blockchain)		
addMinter	address account	▼
approve	address to, uint256 tokenId	▼
mint	address to, uint256 tokenId	▼
renounceMinter		
safeTransferFrom	address from, address to, uint256 tokenId	▼
safeTransferFrom	address from, address to, uint256 tokenId, bytes _data	▼
setApprovalForAll	address to, bool approved	▼
transferFrom	address from, address to, uint256 tokenId	▼
balanceOf	address owner	▼
getApproved	uint256 tokenId	▼
isApprovedForAll	address owner, address operator	▼
isMinter	address account	▼
name		
ownerOf	uint256 tokenId	▼
supportsInterface	bytes4 interfaceld	▼
symbol		
tokenByIndex	uint256 index	▼
tokenOfOwnerByIndex	address owner, uint256 index	▼
tokenURI	uint256 tokenId	▼
totalSupply		

<https://github.com/ethereum/EIPs/blob/master/EIPS/eip-721.md>

Not Secure | remix.cybermiles.io/#version= builtin

browser/PaintingMasterPiece.sol

```
1 pragma lity ^1.2.4;
2
3 // File: openzeppelin-solidity/contracts/introspection/IERC165.sol
4
5 /**
6  * @title IERC165
7  * @dev https://github.com/ethereum/EIPs/blob/master/EIPS/eip-165.md
8  */
9 interface IERC165 {
10 /**
11  * @notice Query if a contract implements an interface
12  * @param interfaceId The interface identifier, as specified in ERC-165
13  * @dev Interface identification is specified in ERC-165. This function
14  * uses less than 30,000 gas.
15  */
16 function supportsInterface(bytes4 interfaceId)
17     external
18     view
19     returns (bool);
20 }
21
22 // File: openzeppelin-solidity/contracts/token/ERC721/IERC721.sol
23
24 /**
25  * @title ERC721 Non-Fungible Token Standard basic interface
26  * @dev see https://github.com/ethereum/EIPs/blob/master/EIPS/eip-721.md
27  */
28 contract IERC721 is IERC165 {
29
30     event Transfer(
31         address indexed from,
32         address indexed to,
33         uint256 indexed tokenId
34     );
35     event Approval(
36         address indexed owner,
37         address indexed approved,
38         uint256 indexed tokenId
39     );
40     event ApprovalForAll(
41         address indexed owner,
42         address indexed operator
43     );
44 }
```

ContractDefinition MyNFT 0 reference(s)

Compile Run Settings

Current version:1.2.4+commit.64034966.Emscripten.clang

Select new compiler version

Start to compile Auto compile Hide warnings

MyNFT

Details Publish on Swarm ABI Bytecode

Address

ERC165

ERC721

ERC721Enumerable

ERC721Full

ERC721Metadata

ERC721Mintable

IERC165

IERC721

[2] only remix transactions, script Search transactions

Game Time





Q&A