

Lecture 17 - Non Fungible Tokens

Non-Fungible Tokens or (NFTs) are in the news with some art tied to a NFT selling for \$69 million.

Art has been plagued with forgeries and theft for ages. The nice thing about a NFT tied to some art work is that the NFT can show the ownership of the art to be a specific account on the chain.

Also the NFT is a a unique "value" for each smart contract. Usually this is then tied to a set of off-chain data that describes what the NFT means.

In the land of Solidity/Ethereum we can build a simple non-fungable token contract using the ERC-721 base and extending it.

```
// SPDX-License-Identifier: MIT
pragma solidity >=0.6.0 <=0.9.0;

import "@openzeppelin/contracts/token/ERC721/ERC721.sol";
import "@openzeppelin/contracts/token/ERC721/extensions/ERC721URIStorage.sol";
import "@openzeppelin/contracts/utils/Counters.sol";

contract SimpleERC721 is ERC721URIStorage {
    using Counters for Counters.Counter;
    Counters.Counter private _tokenIds;
    address private owner;

    constructor() ERC721("SimpleERC721", "S721")
    {
    }

    function mintUniqueToken(address to, string memory tokenURI)
        public returns (uint256)
    {
        _tokenIds.increment();

        uint256 newItemId = _tokenIds.current();
        _mint(to, newItemId);
        _setTokenURI(newItemId, tokenURI);

        return newItemId;
    }
}
```

You can buy, sell, trade ERC721 tokens that support the standard interface on exchanges like Kraken and Coinbase. When you transfer tokens you have to be certain that the destination contract that you are sending the token to can understand a "NFT" token.

The important difference between fungible and non-fungible is that there is a unique ID for non-fungible. This ID can be used to lookup outside unique information about the token.

Notice the tokenURI that is saved with the token. Let's say the token is 132 and it's unique URI is <https://www.register-tokens/d?type=C02CREDIT&id=132> . When we access this URL we can get back meta-information about this token - usually in JSON format.

```
{
  "NFTID": 132,
  "Type": "Co2 Credit",
  "Issuer": "Clear Air, Swuamish BC Canada",
  "Date": "2021-04-18T11:22:33",
  "Signed": "23821903801283902183091283021839021839021830921890128903801280398210"
}
```

Let's take a look at the underlying 721 contract and what it provides.