Web3 Solana Blockchain - 10

Build Your Own NFT

Candy Machine is a fully on-chain generative NFT distribution program. It is great to kickstart Solana NFT development and also understand the overall steps and constructs involved while creating an NFT Marketplace.

The Candy Machine repo remains one of the best repositories for learning, even though it is an outdated repo. You will notice in the GitHub README that it is no longer being maintained.We'll be building our own Candy Machine which will be used to mint NFTs on the Solana Network without paying the minting price for each mint.

Why Solana for NFTs?

Minting a bunch of NFTs is really pricy on other networks and thus we will be minting our NFTs on Solana Network.

Who will pay for minting?

If the minters want to mint a huge number of NFTs (say 10,000,000), it will be very costly for the minter to undertake the cost of minting. Thus, we will be building our own Candy Machine where the price will be paid by the buyer of the NFT.

The candy machine here can be considered analogous to a real-world candy machine where we fill in the machine with candies (NFTs) beforehand & the customers can buy the candy (NFT) by paying the price set earlier for these NFTs.

What will we use?

We will use the de-facto standard for NFTs on Solana - Metaplex.

What is Metaplex and what is Candy Machine?

Metaplex is a collection of tools, smart contracts, and more designed to make the process of creating and launching NFTs easier.

Metaplex is a protocol built on top of Solana that allows:

- Creating/Minting non-fungible tokens (NFTs)
- Starting a variety of auctions for primary/secondary sales

- Visualizing NFTs in a standard way across wallets and applications

The candy-machine is an on chain Solana program (smart contract) that governs fair mints. It will help interact with the candy-machine program. We will be using it to:

- Upload our images and metadata to Arweave, then register them on the solana block-chain
- Verify the state of our candy-machine
- Mint individual tokens

You can follow the below steps to clone and set up the repository within a directory of your choice:

```
git clone https://github.com/Metacrafters/Module2-CandyMachine.git
//Once you have cloned the repo, run the following
cd Module2-CandyMachine
yarn install
```

To check if the installation went well, please run this in the root folder. It would be best if you got an output

``ts-node src/candy-machine-v2-cli.ts --version

We will use the Solana Devnet to deploy our candy machine in this lesson. Let us check if Solana is installed and if our config is set to Devnet.

Ensure that your Solana account has some balance. This balance would be required to create our candy machine.

```
solana --version
solana-cli 1.9.13 (src:3ac7e043; feat:1070292356)

solana config get
Config File: /Users/gyan/.config/solana/cli/config.yml
RPC URL: https://api.devnet.solana.com
WebSocket URL: wss://api.devnet.solana.com/ (computed)
Keypair Path: /Users/gyan/config/solana/devnet-test.json
Commitment: confirmed

solana address
FE2wm72uyHc7vXE8X6WCVrePq9L8MFh7EpDFsLQXNRZv

solana balance
7.88343003 SOL
```

There are two types of assets you can find in the folder:

1. .png : These are images that would be your NFT images.

2. .json: These files represent the metadata for your NFTs and follow the Token Metadata Standard.

The term ***metadata*** talks about data associated with the Non-Fungible token, in this case. The token standard for both Fungible and Non-Fungible tokens is described in the Solana documentation here.

What we need to look at is the Off-chain JSOn Object table in the above image. The “name”, “Description” and “Image” are the main fields that represent the Name of the NFT, the Description of the NFT/NFT Collection as well as the image location of the object that this NFT is pointing to (in our case, the .png image).

There could be several other options associated with the NFT in the form of Attributes that define specific characteristics associated with each image (in our case) or the unique object representing the NFT.

Minting an NFT Using the CLI

We can mint either one token or multiple tokens by using either the “mint_one_token” or “mint_multiple_tokens” command.

Minting One NFT

```
ts-node ./src/candy-machine-v2-cli.ts mint_one_token \ -e devnet \ -k
/Users/gyan/config/solana/devnet-test.json \ -c example
```

Minting Multiple NFTs

```
ts-node ./src/candy-machine-v2-cli.ts mint_multiple_tokens \ -e devnet \ -k
/Users/gyan/config/solana/devnet-test.json \ -c example \ --number 2
```

Yaaay! Now you have successfully learned how to mint your own NFTs on the Solana blockchain. Impressive!

Candy Machine Collections

If you want to take things even further, consider Candy Machine Collections

Candy Machine allows you to set an on-chain collection which will be set during mint, following the on-chain collections specification of the Token Metadata program.