NFT Marketplace

Project report in partial fulfillment of the requirement for the award of the degree of

Bachelor of Technology

In

Computer Science

Submitted By

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Under the guidance of

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CERTIFICATE

This is to certify that the project titled **NFT Marketplace** submitted by **Subhashish De (University Roll No. 12019009022095)**, students of UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA, in partial fulfillment of requirement for the degree of Bachelor of Computer Science, is a bonafide work carried out by them under the supervision and guidance of Prof. Sumit Anand & Prof. Amartya Chakrabarty during 8th Semester of academic session of 2022 - 2023. The content of this report has not been submitted to any other university or institute. I am glad to inform that the work is entirely original and its performance is found to be quite satisfactory.

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Signature of Guide Signature of Guide

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Signature of Head of the Department

ACKNOWLEDGEMENT

We would like to take this opportunity to thank everyone whose cooperation and encouragement throughout the ongoing course of this project remains invaluable to us.

We are sincerely grateful to our guide Prof. Sumit Anand and Prof. Amartya Chakrabarty of the Department of Computer Science, UEM, Kolkata, for his wisdom, guidance and inspiration that helped us to go through with this project and take it to where it stands now.

Last but not the least, we would like to extend our warm regards to our families and peers who have kept supporting us and always had faith in our work.

Subhashish De

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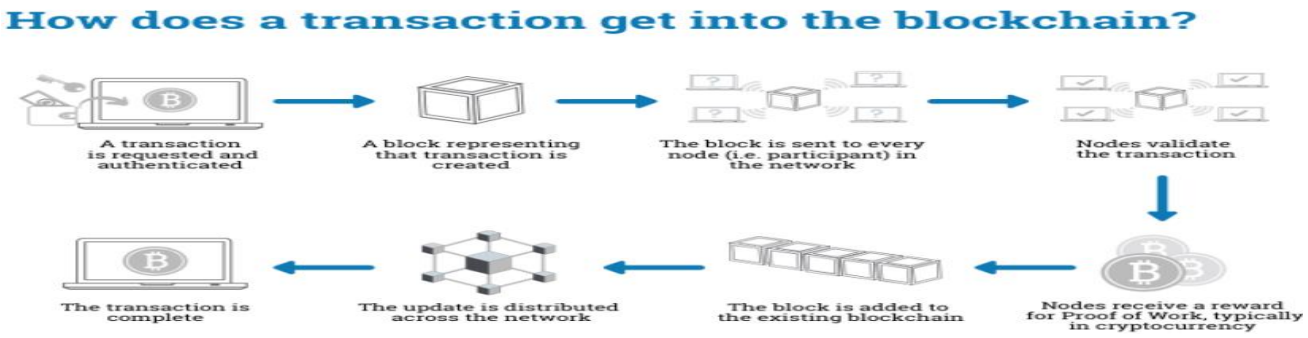
ABSTRACT **1**

Non-fungible tokens (NFTs) are transferrable rights to digital assets, such as art, in-game items, collectables, or music. The phenomenon and its markets have grown significantly since early 2021. We investigate the interrelationships between NFT sales, NFT users (unique active blockchain wallets), and the pricing of Bitcoin (BTC) and Ether (ETH). Using daily data between January 2018 and April 2021, we see that a Bitcoin price shock triggers an increase in NFT sales. Also, Ether price shocks reduce the number of active NFT wallets. The results suggest that (larger) cryptocurrency markets affect the growth and development of the (smaller) NFT market, but there is no reverse effect. The Non-Fungible Token (NFT) market is mushrooming in the recent couple of years. The concept of NFT originally comes from a token standard of Ethereum, aiming to distinguish each token with distinguishable signs. This type of tokens can be bound with virtual/digital properties as their unique identifications. With NFTs, all marked properties can be freely traded with customized values according to their ages, rarity, liquidity, etc. It has greatly stimulated the prosperity of the decentralized application (DApp) market. The total money used on completed NFT sales has reached $34,530,649.86$ USD. The thousandfold return on its increasing market draws huge attention worldwide. However, the development of the NFT ecosystem is still in its early stage, and the technologies of NFTs are pre-mature. Newcomers may get lost in their frenetic evolution due to the lack of systematic summaries. In this technical report, we explore the NFT ecosystems in several aspects. We start with an overview of state-of-the-art NFT solutions, then provide their technical components, protocols, standards, and desired proprieties. Afterward, we give a discussion on the perspectives of their design models, conclusion and future scope.

1) INTRODUCTION 2

Blockchain technology is a distributed ledger that is secure, transparent, and immutable. Blockchain technology can be used to create a decentralized database that is tamper proof and has the potential to revolutionize the way we interact with the digital world.



There are many blockchains available such as Bitcoin, Ethereum, Solana, etc. Within our project we are going to use the Internet Computer blockchain. We are using the blockchain to create an NFT marketplace. An NFT means non fungible tokens which are generally created using the same type of programming used for cryptocurrencies. In simple terms these cryptographic assets are based on blockchain technology. They cannot be traded equivalently like other cryptographic assets.

Here we create an NFT marketplace so that people can create, sell and buy their own NFTs.

NFT (Non Fungible Token) are the non 3 interchangeable cryptographic assets based on digital ledger, where all the unit data of the asset is stored in a unique identity code varying the entire individual digital asset that can be sold or traded. The NFT possess any form of data unit such as image, video and audio files as each token has unique identity code. Unlike Crypto currencies such as bitcoin or ethereum NFT differ from each other. It can be associated with any physical asset or virtual drawing or art. All the NFTs are hosted on blockchain protocol so as not to have security breaching. To this date almost every NFT creator prefer ethereum based blockchain (ERC-721) as it is suitable for NFTs making the token unique from the previous one. Several other blockchain networks have since begun supporting NFTs such as the Binance Smart Chain. Many argue that the latter is more suitable for buying and selling the best NFTs tokens, not least because Ethereum transaction fees are often super-high. In many ways, NFTs are not too dissimilar to traditional digital currencies like Bitcoin, Ethereum, and Dogecoin. The reason for this is that NFTs are represented as digital assets and they operate on top of a blockchain network. This ensures that NFTs can be transferred from wallet to wallet in a fast, secure, and low-cost way. Being built on top of a blockchain network also ensures that NFTs are verifiable in a transparent way. However, where NFTs are different from the aforementioned digital currencies is that each token is identifiable via a unique transaction hash. In simple terms, this means that no two NFTs are the same.

2) PROBLEM STATEMENT 3

The increasing popularity of NFTs (Non-Fungible Tokens) has led to a surge in demand for platforms that enable users to buy, sell, and trade these unique digital assets. However, existing platforms for NFT transactions often suffer from a range of issues, including high transaction fees, slow processing times, and limited functionality. Furthermore, the existing platforms often do not offer a seamless user experience for individuals looking to participate in the NFT market, leading to confusion and frustration for new users. Additionally, there are concerns about the security of NFT transactions, as hackers may attempt to steal or manipulate NFTs, leading to significant financial losses for users. To address these challenges, there is a need for a new platform for NFT transactions that provides a secure, user-friendly, and efficient environment for buying, selling, and trading these digital assets. This platform should offer low transaction fees, fast processing times, and a wide range of features to cater to the needs of different users, including artists, collectors, and investors. Additionally, the platform should provide robust security measures to ensure that NFTs are protected from theft or manipulation. Overall, the challenge is to design and develop a platform for NFT transactions that is reliable, accessible, and easy to use, while also addressing the various technical and security challenges associated with NFTs.

3) PROPOSED SOLUTION 4

We create a website using the Internet Computer blockchain in which we can buy, sell and create NFTs. Here we attempt to lower the transaction fees and try to make the transaction much more fast and efficient. In terms of technology we have used HTML, CSS, Javascript, Node, React and Motoko programming language.

4) EXPERIMENTAL SETUP AND RESULT ANALYSIS 5

We setup our project on the Internet Computer blockchain using React as frontend and the Motoko programming language as backend. In order to start the project, we open the project in VS Code, then open the terminal and the command “dfx start”, then split the terminal and enter the command “dfx deploy”. This starts and deploys our frontend and backend canisters with their specific unique id. Then we enter “npm install” in the same terminal. Then we enter “npm start”. The localhost location is also obtained – “localhost: 8080”.

Go to browser and enter “http://localhost:8080”. The project gets displayed on the screen. On the homepage of the website there are three options on the navbar (i) Discover (ii) Minter (iii) My NFTs.

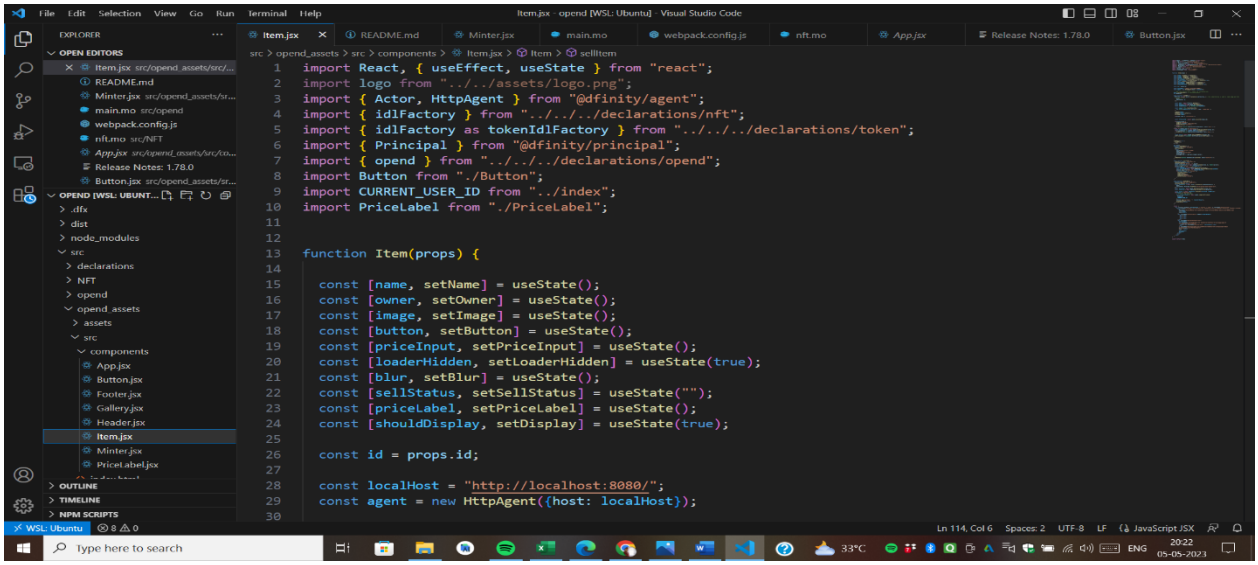
(i) when we open the discover page we can see the NFTs listed for sale. Here we can buy the NFTs.

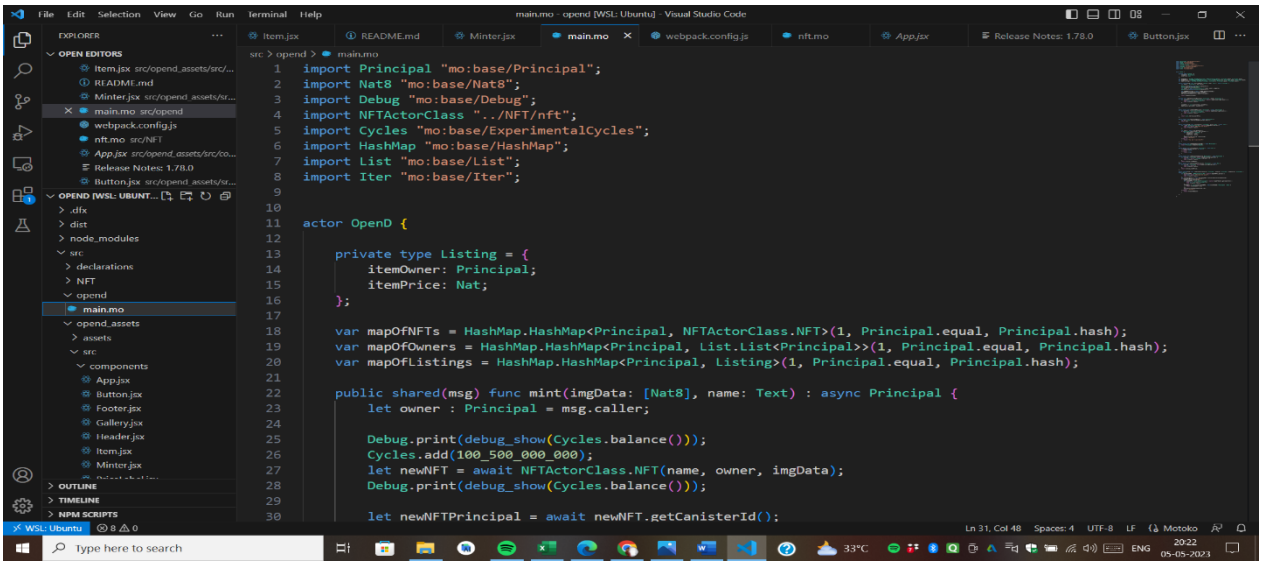
(ii) when we open the minter page we can create NFTs with random images and names. After creating, the NFTs get listed on My NFTs section.

(iii) when we open the My NFTs page we can see the NFTs which we have bought and which we want to sell.

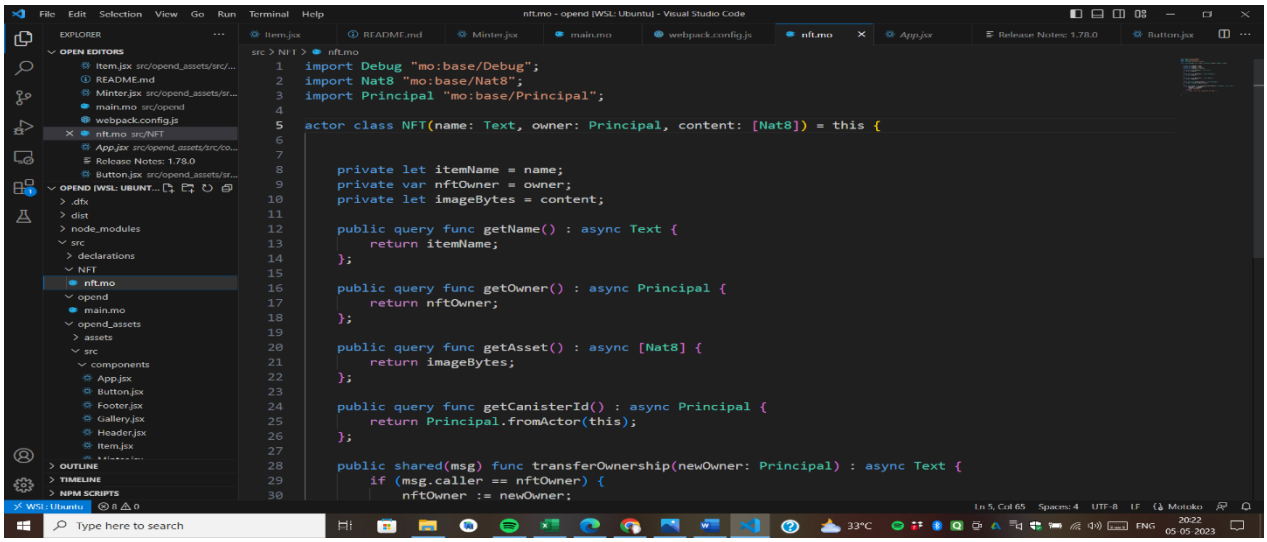
In a new window of VS Code we open our crypto token project where we can see our account balance after buying and selling of NFTs. Then we open a new terminal then write “dfx deploy” (Make sure “dfx start” is already working in our opend project). Then in the same terminal write “npm install”. Then we write “npm start”. Then we get local address “localhost:8081”, we open the “README.mo” file. In that file we use commands to borrow 10000 DANG (DANG is the name of our token) into our own crypto account. As we buy our NFTs from the ‘opend’ project out crypto token balance gets deducted every time and each time we can check the balance using our own account number.

We attach a few screenshots of the coding :

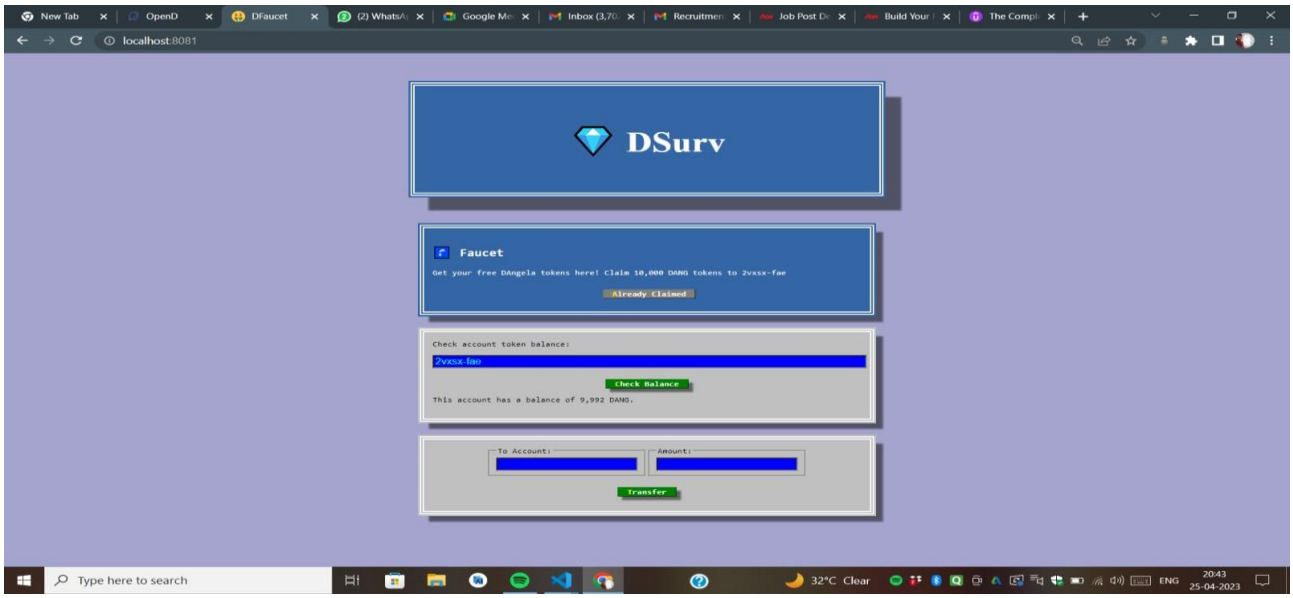




```
import Principal "mo:base/Principal";
import Nat8 "mo:base/Nat8";
import Debug "mo:base/Debug";
import NFTActorClass "../NFT/nft";
import Cycles "mo:base/ExperimentalCycles";
import HashMap "mo:base/HashMap";
import List "mo:base/List";
import Iter "mo:base/Iter";


actor OpenD {

    private type Listing = {
        itemOwner: Principal;
        itemPrice: Nat;
    };

    var mapOfNFTs = HashMap.HashMap<Principal, NFTActorClass.NFT>(1, Principal.equal, Principal.hash);
    var mapOfOwners = HashMap.HashMap<Principal, List.List<Principal>>(1, Principal.equal, Principal.hash);
    var mapOfListings = HashMap.HashMap<Principal, Listing>(1, Principal.equal, Principal.hash);

    public shared(msg) func mint(imgData: [Nat8], name: Text) : async Principal {
        let owner : Principal = msg.caller;

        Debug.print(debug_show(Cycles.balance()));
        Cycles.add(100_500_000_000);
        let newNFT = await NFTActorClass.NFT(name, owner, imgData);
        Debug.print(debug_show(Cycles.balance()));

        let newNFTPrincipal = await newNFT.getCanisterId();
```



```
import Debug "mo:base/Debug";
import Nat8 "mo:base/Nat8";
import Principal "mo:base/Principal";

actor class NFT(name: Text, owner: Principal, content: [Nat8]) = this {


    private let itemName = name;
    private var nftOwner = owner;
    private let imageBytes = content;

    public query func getName() : async Text {
        return itemName;
    };

    public query func getOwner() : async Principal {
        return nftOwner;
    };

    public query func getAsset() : async [Nat8] {
        return imageBytes;
    };

    public query func getCanisterId() : async Principal {
        return Principal.fromActor(this);
    };

    public shared(msg) func transferOwnership(newOwner: Principal) : async Text {
        if (msg.caller == nftOwner) {
            nftOwner := newOwner;
```




localhost:8080
OpenD
Discover
Minter
My NFTs
CRYPT DUNKS
The Internet Computer's largest digital marketplace for crypto collectibles and non-fungible tokens (NFTs). Buy, sell, and discover exclusive digital items.
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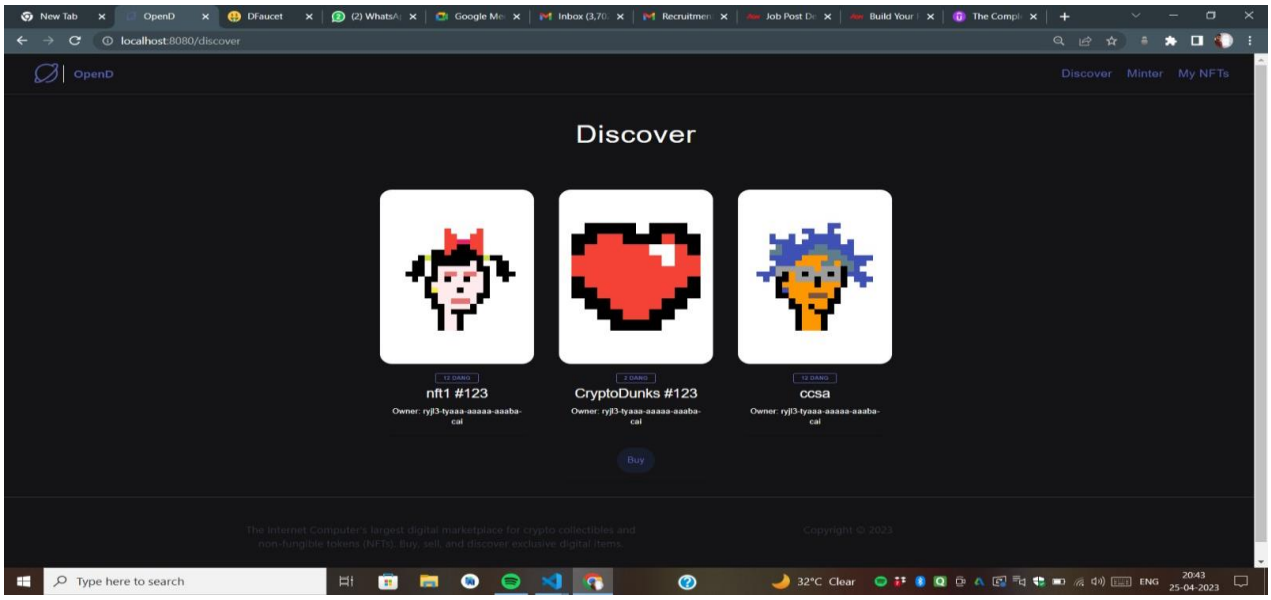
localhost:8080/discover
OpenD
Discover
Minter
My NFTs
Discover
nft1 #123
CryptoDunks #123
ccsa
Owner: ryjl3-tyaaa-aaaaa-aaaba-cai
Buy
The Internet Computer's largest digital marketplace for crypto collectibles and non-fungible tokens (NFTs). Buy, sell, and discover exclusive digital items.
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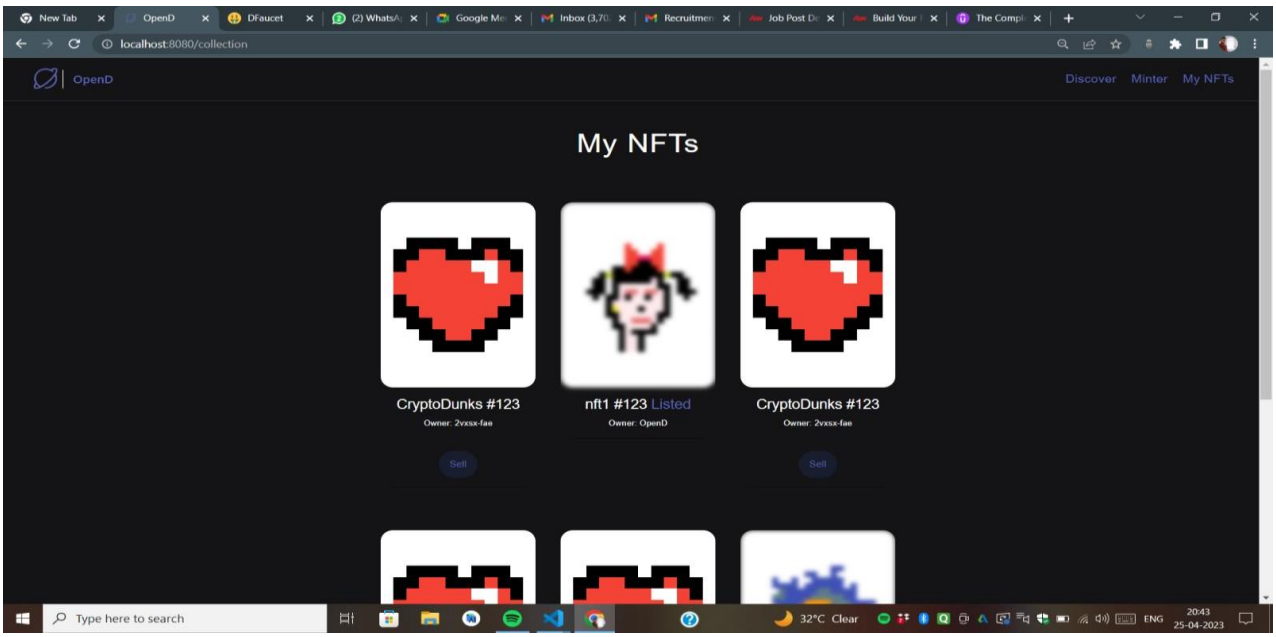
localhost:8080/collection
OpenD
Discover
Minter
My NFTs
My NFTs
CryptoDunks #123
nft1 #123 Listed
CryptoDunks #123
Owner: 2vxsx-fae
Owner: OpenD
Sell
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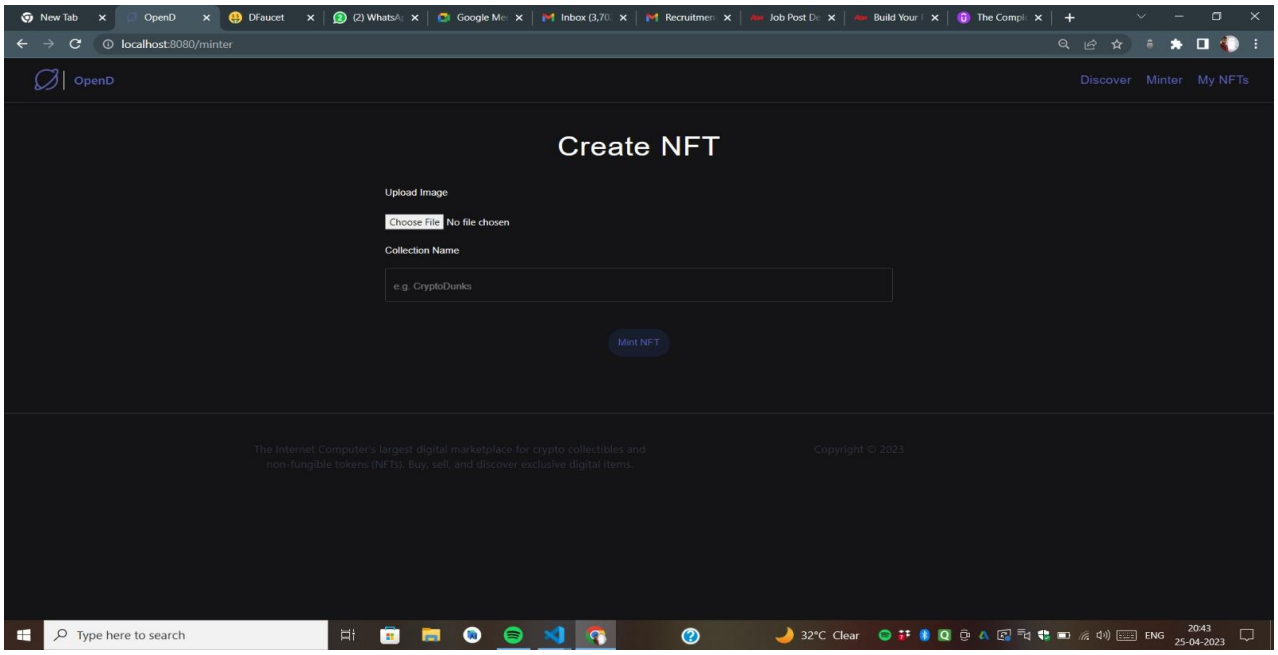
New Tab
OpenD
DFaucet
localhost:8080/minter
OpenD
Discover
Minter
My NFTs
Create NFT
Upload Image
Choose File
No file chosen
Collection Name
e.g. CryptoDunks
Mint NFT
The Internet Computer's largest digital marketplace for crypto collectibles and non-fungible tokens (NFTs). Buy, sell, and discover exclusive digital items.
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5) CONCLUSION AND FUTURE SCOPE 9

NFT marketplace is the new age marketplace for trading, selling, and buying digital works. With the growing popularity and increasing valuation of cryptocurrency, it is safe to assume that the marketplaces for NFTs and the whole blockchain network will stay in demand in the long run, which is why it is vital in recent times and the coming future. NFT marketplaces are yet to see their peak. With the digital versions of different art forms, collectibles, creative assets, and even from the physical world are making waves, the NFT marketplace is a business worth pursuing. A much more advanced website can be developed in the future where the ones creating the NFTs can be rewarded royalties every single time their NFT is resold on the secondary market.

1) Udemy

2) The App brewery

3) internetcomputer.org

4) dfinityfoundation.org

5) Stackoverflow

6) Youtube