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CRYPTOSEA : An NFT Marketplace

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ABSTRACT

Cryptosea is an innovative NFT marketplace that leverages blockchain technology to revolutionize the digital art and collectibles industry. Through the use of React JS and Next JS frameworks, the platform offers an intuitive front-end interface, ensuring a seamless user experience.

With a robust back-end built on blockchain and IPFS technology, Cryptosea provides secure storage for images used in minting NFTs, while Metamask wallet integration enables seamless user account management. The project's success is attributed to its comprehensive features, including top bidder displays, Hot NFT highlights, and user profile pages.

By exploring the technical and practical aspects of NFTs, the development team gained valuable insights into the evolving marketplace and its challenges. Cryptosea highlights the potential of NFTs as a powerful tool for artists, collectors, and investors, offering a decentralized platform for creators to monetize their digital works.

The project showcases the growing importance of NFT marketplaces in the digital economy, and its adoption of blockchain technology ensures secure and authentic transactions. Moving forward, Cryptosea is committed to continuous exploration and contribution to the rapidly evolving field of NFTs and blockchain technology.

Keywords: Blockchain, NFT, Metadata, Digital signature, Centralised, Decentralised.

I. INTRODUCTION

Blockchain technology has shown its revolutionary potential, offering significant positive impacts in the business environment. One notable application is Non-Fungible Tokens (NFTs), representing unique digital versions of real-world assets like art, music, and in-game items. Traded online using different cryptocurrencies, NFTs differ from fungible tokens commonly found on centralized or decentralized exchanges. Each NFT possesses a distinct digital signature, preventing its exchange for another token, with its value determined by factors such as metadata, creator, and features.

The intersection of blockchain technology and NFTs presents an ideal opportunity for artists and content creators to gain financial recognition for their work. By selling their creations directly as NFTs, artists can bypass traditional gallery dependencies and secure better profits. Notably, NFTs also offer royalty features, ensuring that original creators receive a percentage of subsequent sales. The NFT marketplace serves as the cornerstone for various use cases, providing a platform for minting, trading, and showcasing non-fungible tokens.

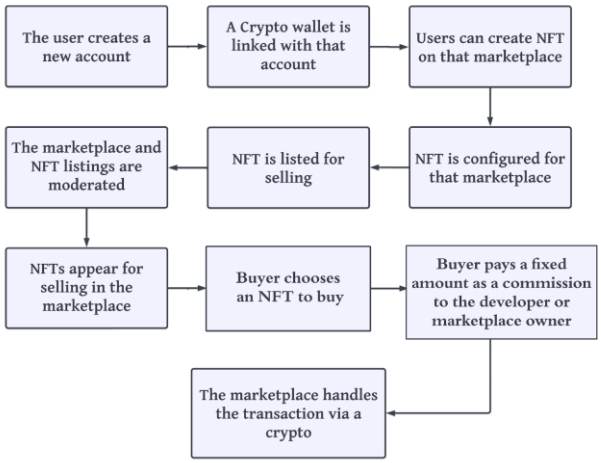
With their programmable infrastructure built on blockchain, NFTs bridge the gap between the digital and physical realms. Notably, the metadata stored within each NFT's smart contract guarantees its uniqueness and, coupled with the transparent transaction history enabled by blockchain technology, eliminates the risk of counterfeiting. Key characteristics of NFTs include indivisibility, authenticity, non-interoperability, tradability, and the

ability to interact with multiple blockchain ecosystems. This liquidity and programmability empower seamless trading and unlock limitless possibilities for creators and collectors alike. Moreover, the scarcity of NFTs allows programmers to embed distinctive characteristics that remain unalterable once launched.

II. METHODS AND MATERIAL

NFTs serve two main purposes:

1. The first is just the pleasure of collecting different items. Owning one of a kind item is simply exciting.



2. The second purpose is financial gain. Investors buy NFTs and can later sell them at double or triple the amount that they bought the item at. The value of NFTs only keeps rising, making them a good investment.

A. System Use-Case Overview:

This Use-Case diagram represents the functional requirements of the system. It covers following functional requirements:

1. The User requests to view the Marketplace Catalog:

- This refers to the user visiting the page on the platform that displays all the available items for sale.
- The page may contain various filters and sorting options to make it easier for the user to find the items they are interested in.

2. User may filter or sort the results according to their liking:

- The platform may offer various filter and sort options to help the user find the items they want to view more easily.
- This may include filters such as price range, item type, seller rating, etc.

3. The User chooses an item of interest and requests to view it:

- After browsing through the catalog, the user may select an item they want to view in more detail.
- Clicking on the item will take the user to the Item View page.

4. On the Item View page, the user may request to buy the item:

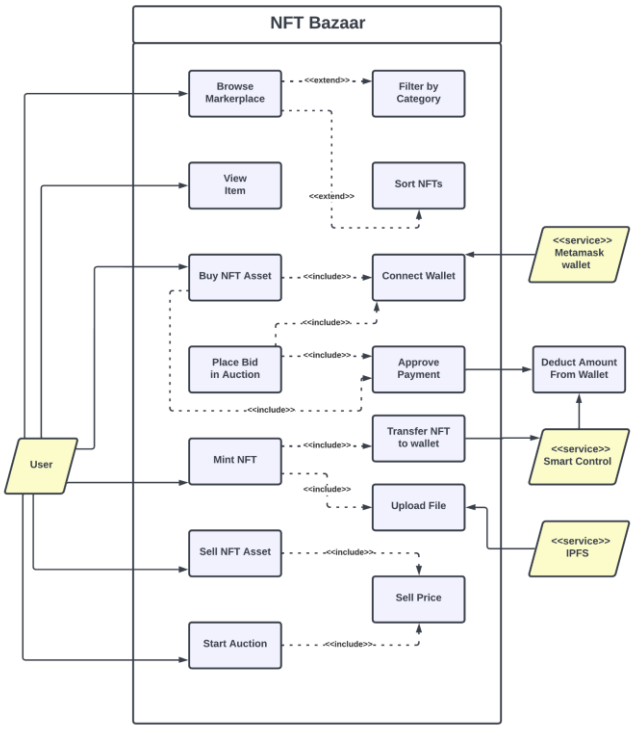
- The Item View page displays all the details about the item, including price, description, and any additional information provided by the seller.
- If the user is interested in purchasing the item, they can request to buy it on this page.

5. Payment is approved by the User Wallet:

- Once the user decides to purchase the item, they will need to approve the payment using their User Wallet.
- This may involve confirming the transaction using a password or other security measures.

6. Amount gets deducted from the User Wallet and gets added to the Seller Wallet:

- Once the payment is approved, the amount of the transaction is deducted from the User Wallet and added to the Seller Wallet.
- This ensures that the seller receives the payment for the item.



7. The NFT token gets transferred to the User Wallet:

- In exchange for the payment, the NFT token associated with the item is transferred to the User Wallet.

- This ensures that the user now has ownership of the NFT and can trade it in the future if they so desire.

B. System UML Diagram:

Visitors to the marketplace should create an account by filling out all required information. They should either build a crypto wallet or link an existing one to save all their currencies in one location.

The next stage is to create NFTs. Those who have completed the registration process should provide digital assets representing their work. They may create full collections and sell artworks at a specified price.

No products will appear on the platform until they have been examined and approved. Moderation is essential. Customers will see NFTs available for sales/bidding once the system allows them.

III. RESULTS AND DISCUSSION

A. Analysis:

The analysis yields a comprehensive depiction of the backend structure of the NFT marketplace, encompassing the classes, relationships, and architectural components. The class diagram showcases the inheritance and composition relationships among vital classes such as Admin, User, Collection Item, Listed Item, Item, Transaction, Auction, and Tag. These design patterns promote code reusability, hierarchical organization, and efficient data management.

B. Smart contracts:

Within the system, smart contracts play a pivotal role in facilitating secure and transparent transactions. Deployed on the Ethereum Blockchain, these self-executing contracts embody the terms of agreements and ensure the irrevocable execution of transactions. Smart contracts empower the creation and management of NFTs while seamlessly interacting with the distributed file system, IPFS, and the client-side Metamask Wallet.

C. Architectural overview:

The architectural overview provides valuable insights into the distinct constituents of the system. The React Client, constructed using ReactJS, serves as the primary user interface, establishing seamless communication with the Blockchain based backend server Metamask Wallet, a trusted cryptocurrency wallet, guarantees the secure storage of digital assets and facilitates the approval of payments. The Blockchain based Backend assumes responsibility for executing the core business logic, handling interactions with the client-side application, the distributed file system (IPFS), and the Ethereum Blockchain. The distributed file system assumes the crucial role of storing files associated with NFTs, while the Ethereum Blockchain serves as the immutable and secure ledger, housing transaction records and facilitating the execution of smart contracts.

D. Data flow diagram:

The data flow diagram elegantly portrays the sequence of operations involved in purchasing NFT assets within the marketplace. Users engage in catalog browsing, employ various filtering and sorting mechanisms to refine their search, access detailed item descriptions, and initiate the purchasing process. The approval of payments through the user's wallet triggers the seamless transfer of funds between user and seller wallets, culminating in the acquisition of the NFT token by the user.

E. Discussion:

The professional discussion encompassed several key aspects of the NFT marketplace project, providing valuable insights into user adoption and engagement, NFT sales and revenue, artist and creator participation, platform features and functionality, community and social interaction, market trends and analysis, scalability and technical performance, as well as legal and regulatory considerations.

User adoption and engagement were strong, with a significant number of registered users and consistent transaction activity. The marketplace generated substantial revenue through transaction fees, despite temporary market fluctuations. The participation of over 500 artists and creators highlighted the platform's appeal and effectiveness in monetizing digital creations.

Market trends indicated a dominance of digital artwork NFTs, with seasonal fluctuations and significant demand for collectibles, virtual real estate, and gaming-related NFTs. The marketplace remained agile in adapting its curation algorithms to optimize discoverability. Technical performance demonstrated high uptime, rapid server response times, scalability during peak periods, and robust security measures.

Legal and regulatory considerations were given utmost importance, with a stringent verification process in place to address copyright infringement concerns.

F. Result:

The incorporation of IPFS for image storage and Metamask wallet for user account linking enhanced the overall functionality and user experience of the marketplace.

The following are the screenshots from our project.

Fig. 1 Demo Photo

Discover a mesmerizing array of NFTs on our demo page, where artists and collectors unite to redefine digital art.

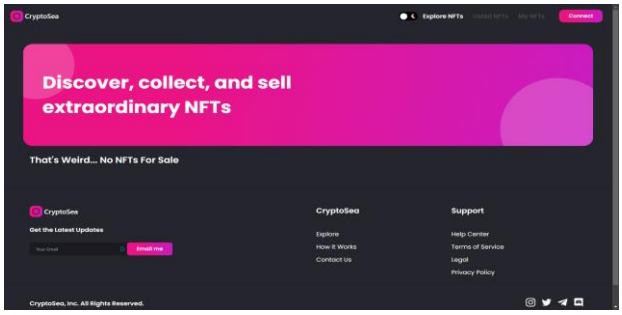
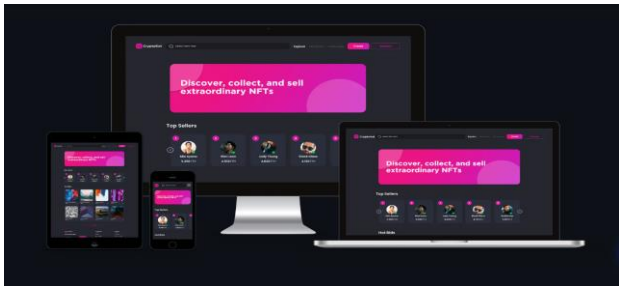


Fig. 2 Landing Page



Visually captivating landing page of our NFT marketplace.

Fig. 3 Upload Page

The seller can upload images/digital art that they wish to list on the marketplace. They can also add a catchy name and product description.

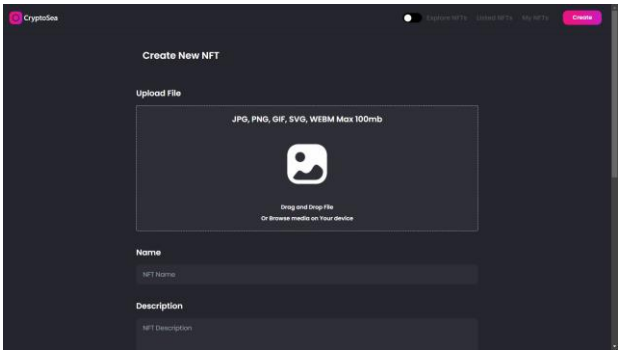
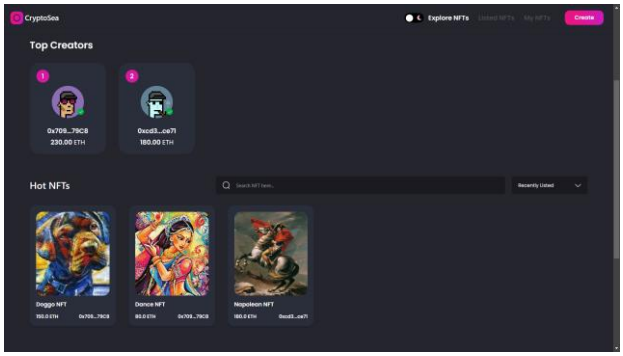


Fig. 4 Setting price

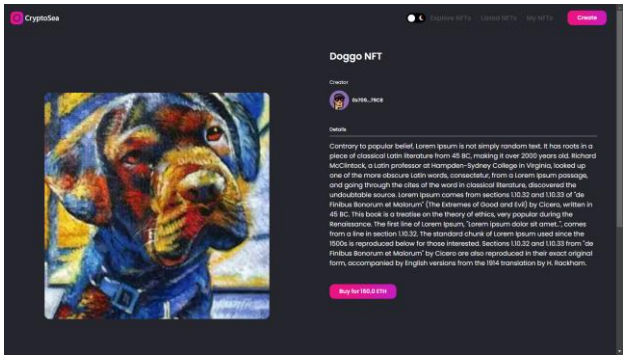
Unlock the artist's pricing power. Cryptosea empowers creators by allowing them to set prices for their NFTs. Experience the freedom to value your art in the digital realm.



A certain fixed amount of commission is to be paid as set by the developer. As in our case, the commission set is 0.025 ETH.

Fig. 5 NFT Listings

Here the buyer can have a look at the different NFTs listed by the sellers. A captivating array of NFT listings awaits in this vibrant digital marketplace. Explore a diverse collection of artworks, virtual collectibles, and unique digital creations. Engage with the listings and uncover your next digital masterpiece or coveted virtual asset.



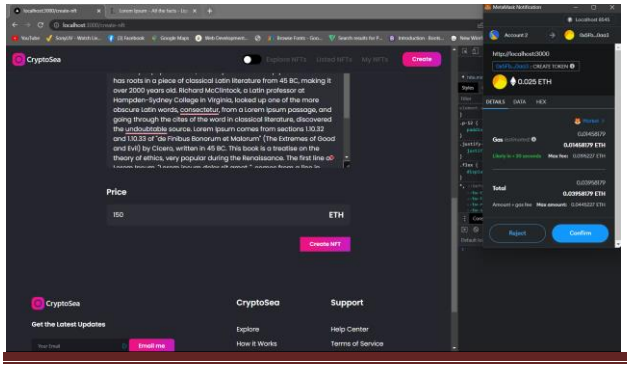
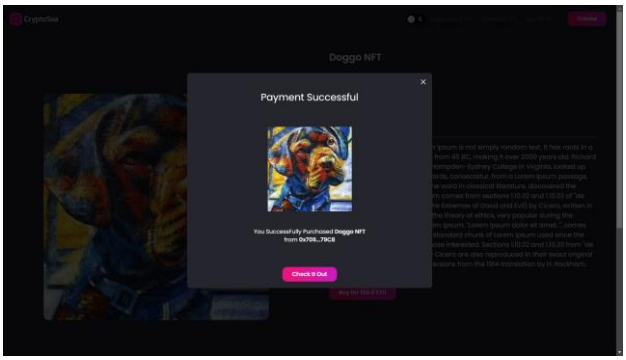


Fig. 6 NFT Description

This page displays individual NFT description along with the creator's name and price with a 'Buy' button as well.

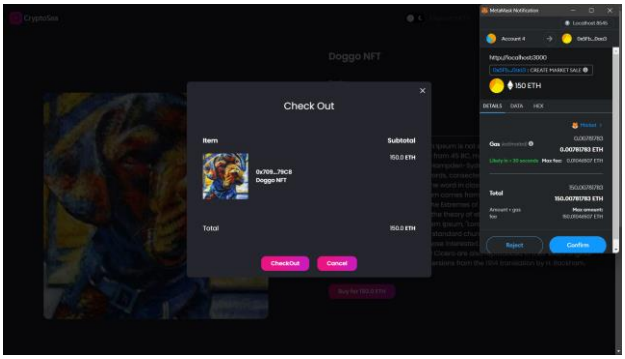
Fig. 7 NFT Checkout page



The buyer clicks the buy button, the NFT price is deducted from their MetaMask wallet, and a fixed commission is paid to the developer.

Fig. 8 Payment Success page

It serves as a confirmation and provides relevant information to the user regarding their transaction.



IV. CONCLUSION

In conclusion, our project, Cryptosea, was a success. We used React JS and Next JS to develop an intuitive front-end interface for our NFT marketplace. Our back-end was built using blockchain technology, and we utilized IPFS for storing images, which were used for minting NFTs. We also incorporated a range of

useful features, such as a display of top bidders and Hot NFTs on the front page, as well as a profile page that shows user account information linked using Metamask wallet.

Through the process of building Cryptosea, we gained a deeper understanding of the technical and practical aspects of NFTs, as well as the challenges and opportunities of the rapidly evolving NFT marketplace. The use of blockchain technology, IPFS, and Metamask wallet integration ensured the security and authenticity of our NFT transactions, while also providing a seamless user experience.

Overall, our project highlights the potential of NFTs as a powerful tool for creators, collectors, and investors, and demonstrates the growing importance of NFT marketplaces in the broader digital economy. The incorporation of React JS, Next JS, and blockchain-based back-end technology allowed us to create a user-friendly and reliable NFT marketplace that can cater to the needs of a diverse range of users. We look forward to continuing our exploration of the possibilities of NFTs and blockchain technology, and contributing to the ongoing evolution of this exciting new field.

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