

# NFT HUB – Case Study

*Solana NFT Marketplace for Creating, Discovering & Trading Digital Collectibles*

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## 1. Project Overview

NFT HUB is a platform for discovering, creating, and trading digital collectibles on the Solana blockchain. It's positions as a "Solana NFTs Marketplace – Create, Sale, Buy", highlighting the complete NFT lifecycle: minting, listing, and purchasing NFTs within a single, consistent experience.

The marketplace serves three primary audiences:

- Creators who mint NFTs, launch collections, and manage their storefronts on-chain and through user-friendly dashboards.
- Collectors who browse curated drops, top promotions, weekly collections, and category-based galleries.
- Brands and communities that leverage a branded NFT storefront with analytics and growth tools for their ecosystems.

The primary user surface is the marketplace application itself, complemented by a structured footer with sections such as Marketplace, Resource, Account, Company, and a newsletter subscription block for ongoing community engagement.

## 2. Objectives

The implementation of NFT HUB was guided by four concrete objectives:

- Provide an end-to-end NFT lifecycle: from setting up a wallet to creating collections, adding NFTs, and listing them for sale. This flow is visualized in the homepage's four-step "Step by step Create and Sell Your NFTs" section.
- Deliver a friendly user experience for both creators and collectors through clear navigation (Home, Top NFTs, About, Popular, Action, Discover) and persistent "Connect Wallet" entry points.
- Support a category-driven marketplace with multiple verticals, including All NFTs, Virtual worlds, Domain names, Photography, Digital art, and Music, wired into metadata and filters.
- Embed analytics and growth hooks from day one, using counters such as NFT Sale, Created NFT, Crypto, and Technology, as well as community and newsletter modules for retention and communication.

## 3. User Roles & Journeys

### 3.1 Creators

Creators use NFT HUB to onboard, mint, and monetize their digital works through a guided, wallet-centric flow.

- Connect their Solana wallet through the header's "Connect Wallet" call-to-action.
- Create and manage collections via Account-area links such as My Collection, Create Collection, Author Profile, Go to dashboard, and Collection.
- Mint NFTs by uploading media, defining metadata (title, description, attributes), and configuring royalties.
- List NFTs for sale using fixed-price or configured sale options.

A typical creator journey in NFT HUB is: Connect Wallet → Create Collection → Upload Media & Metadata → Set Price & Royalties → List NFT.

### 3.2 Collectors

Collectors use NFT HUB to discover, evaluate, and purchase NFTs across multiple categories and curated views.

- Explore Top NFTs Promotions and Top collections in week, which highlight trending, high-quality, or curated assets.
- Filter NFTs by category (e.g., Virtual worlds, Photography, Digital art) to focus on preferred verticals.
- Open NFT detail pages to inspect artwork, pricing, creator information, and collection context.
- Purchase NFTs via wallet-based checkout with clear transaction prompts and statuses.

A typical collector journey is: Land on Home → Browse Promotions / Collections → Open NFT Detail → Connect Wallet → Confirm Purchase.

## 4. System Architecture

NFT HUB is implemented as a modular system across frontend, backend, and on-chain components. The architecture is designed for maintainability, performance, and the ability to grow as the marketplace and user base expand.

### 4.1 Frontend

The frontend is implemented as a single-page application (SPA) using a modern JavaScript framework with component-based design and a responsive layout optimised for desktop and large-tablet browsing.

- Hero banner with “Solana NFTs Marketplace Create, Sale, Buy” messaging, a “Join Now” call-to-action, and supporting copy about buying and selling premium digital artworks.
- Top NFTs Promotions grid with numbered items listing NFT names, authors, and prices, providing a curated discovery surface.
- “Step by step Create and Sell Your NFTs” section with four illustrated cards: Set Up Your Wallet, Create collection, Add your NFTs, Sell your NFTs.
- Top collections in week section featuring visually rich collection cards (e.g., Bored ape#21, Gym ape#21, Healthy ape#21) with creator handles, item counts, and like metrics.
- Footer navigation with Marketplace, Resource, Account, Company, Join the community, plus Privacy Policy, Terms of Service, and a “Subscribe to our newsletter” pop-up.

Frontend state management handles wallet connection state, user profiles, NFT and collection filters and sorts, and transaction status indicators and notifications.

### 4.2 Backend & API Layer

A dedicated backend and API layer manages all data and coordination between the frontend and the Solana blockchain.

- REST or GraphQL endpoints provide NFT and collection lists with pagination, filtering, and sorting.
- Endpoints expose author profiles, account data, and marketplace metrics, including sales, likes, floor prices, and volume.
- Data from on-chain sources and decentralized storage (IPFS/Arweave) is normalized into a single schema consumed by the frontend.
- Popular sections such as Top NFTs Promotions and Top collections in week are cached to deliver fast responses.

- A relational database stores NFTs, collections, user profiles, transactions, and aggregated statistics, with indexes on category, owner, collection ID, price, and timestamps for efficient querying.

#### **4.3 Blockchain & Smart Contract Layer**

The on-chain layer is built on Solana, following established NFT and marketplace patterns for security and interoperability.

- Minting programs create NFTs and link them to metadata URIs stored on decentralized storage solutions such as IPFS or Arweave.
- Marketplace programs manage listing creation, updates, and cancellation, as well as escrow and settlement of assets and funds.
- Royalty logic is embedded in the on-chain programs, reading configured percentages from metadata and distributing proceeds between seller, creator, and platform fee accounts on each sale.
- Media files and metadata JSON are referenced from on-chain metadata accounts; the backend periodically fetches, parses, and indexes them for the UI.

## **5. Feature Breakdown**

### **5.1 Home & Discovery**

The home page of NFT HUB serves as a discovery and conversion hub, combining clear messaging with curated content blocks.

- Hero message that invites users to buy and sell NFTs from the world's top artists, highlighting the availability of premium digital artworks.
- Top NFTs Promotions: a ranked list of featured NFTs, each showing the name, creator, and price, configured as a curated entry point into the marketplace.
- Top collections in week: a section showcasing collections with names, creator handles, item counts, and like counts to emphasise activity and social proof.
- A "Discover, create and sell your own NFT" call-out that reiterates NFT HUB's role as both a creation and discovery platform.

### **5.2 Guided NFT Creation Funnel**

The four-step funnel "Step by step Create and Sell Your NFTs" is implemented as the primary creator onboarding flow.

- Step 1 – Set Up Your Wallet: guides users to connect a compatible Solana wallet using standard wallet adapters, with clear instructions and error handling.

- Step 2 – Create collection: provides forms for defining collection name, description, category, royalty percentages, and branding assets.
- Step 3 – Add your NFTs: implements media upload and metadata entry (title, description, attributes), with validation and preview before minting.
- Step 4 – Sell your NFTs: handles listing configuration and on-chain listing transactions, after which the marketplace indexes and displays the new listings.

This funnel ties together step-aware UI, wallet transactions, and backend indexing to make NFT creation approachable for both new and experienced web3 users.

### **5.3 Marketplace Navigation & Categories**

NFT HUB implements a category-driven navigation scheme so users can quickly focus on the types of NFTs they care about most.

- Marketplace footer menu entries such as All NFTs, Virtual worlds, Domain names, Photography, Digital art, and Music map directly to metadata-based filters.
- Each category filter corresponds to a focused gallery or landing view, making it easy to browse photography-only collections, metaverse land, or music-related NFTs.
- Category metadata is stored alongside NFT records, allowing the backend to efficiently query and sort by vertical.

### **5.4 Accounts, Authors & Collections**

The Account area is implemented as a complete profile and collection management suite for NFT HUB users.

- Authors: a directory of creator profiles with avatars, bios, and social links.
- My Collection: a personalized view showing NFTs owned or minted by the connected wallet address.
- Author Profile: an editable profile page where creators configure their public identity on the platform.
- Go to dashboard: a dashboard for reviewing listings, tracking sales, and monitoring royalty earnings.
- Collection and Create Collection: screens for defining, updating, and managing collections associated with a wallet.

All of these features are tied to wallet addresses and supported by secure session handling to keep the experience seamless and safe.

## 5.5 Analytics & Community

NFT HUB includes surface-level analytics and community features to support growth, transparency, and engagement.

- An analytics widget presents counters such as NFT Sale, Created NFT, Crypto, and Technology, giving a quick snapshot of activity and content volume.
- Help center and Platform status links under Resource and Company sections provide users with documentation and uptime transparency.
- Join the community area with social icons encourages users to connect on external platforms.
- A newsletter subscription pop-up invites users to subscribe and “stay in the loop”, enabling ongoing communication with collectors and creators.

## 6. Technical Challenges & Solutions

### 6.1 NFT Metadata & Media Storage

#### Challenge:

*Media and metadata needed to be stored in a decentralized, durable way while still providing fast load times inside the marketplace interface.*

#### Solution:

- Media files and JSON metadata are uploaded to decentralized storage such as IPFS or Arweave.
- On-chain metadata accounts store URIs pointing to this content, ensuring long-term referenceability.
- The backend fetches and parses metadata, then caches it to minimise latency when rendering NFT cards and detail views.

### 6.2 Marketplace Performance at Scale

#### Challenge:

*Serving lists of NFTs and collections with multiple filters and sorts required efficient data access to avoid sluggish responses.*

#### Solution:

- A relational database with indexes on owner, category, collection ID, price, and timestamps backs listing queries.

- Pagination and cursor-based APIs are used for NFT and collection endpoints to keep responses lightweight.
- Curated blocks such as Top NFTs Promotions and Top collections in week are precomputed and cached for instant loading.

### 6.3 Wallet & Transaction UX

#### Challenge:

*On-chain actions such as minting, listing, and buying NFTs are complex and can fail due to network issues, user cancellation, or RPC limits.*

#### Solution:

- NFT HUB integrates Solana wallet adapters to handle connections and signature requests.
- Each on-chain operation is wrapped in a dedicated flow with clear states: connecting, signing, submitted, confirmed, or failed.
- User-friendly error messages and retry suggestions help less technical users understand and recover from issues.

### 6.4 Royalty & Secondary Sales Logic

#### Challenge:

*Royalties needed to be applied consistently across primary and secondary sales to respect creator economics and avoid manual handling.*

#### Solution:

- Royalty percentages are defined during minting and stored in NFT metadata.
- Marketplace programs read these royalty values on each sale and automatically split proceeds between seller, creator, and platform fee accounts.
- This logic is applied across all supported sale flows, ensuring reliable royalty enforcement.

## 6.5 Security & Listing Integrity

### Challenge:

*Protecting users from fake collections and unsafe contracts was essential to maintaining trust in the marketplace.*

### Solution:

- A verification pipeline for collections allows trusted projects to receive a verified badge after internal review.
- Smart contract interactions are limited to vetted marketplace and mint programs.
- Server-side checks validate ownership and metadata before allowing NFTs to be listed.

## 7. Outcomes

NFT HUB delivers a live, production-grade Solana NFT marketplace where creators can set up wallets, create collections, mint NFTs, and list them for sale through a guided, step-based flow.

- A discovery-oriented landing page with curated promotions and weekly top collections, supported by category-driven navigation for different NFT verticals.
- A robust backend and indexing layer that supports real-time filtering, sorting, and analytics without compromising performance.
- A complete transaction layer combining decentralized storage, Solana smart contracts, and a polished wallet-based user experience.
- An architecture that can be extended with richer analytics, social features, and new NFT categories as the ecosystem grows.

## 8. Conclusion

NFT HUB is a cohesive, production-ready ecosystem for Solana NFTs. It brings together a clear creator funnel, a powerful discovery experience, and a reliable on-chain transaction layer into a single, branded platform. From the moment a user lands on the hero section to the final NFT sale, every critical step—wallet connection, creation, listing, and purchase—is handled within a consistent, well-integrated interface.

The underlying architecture has been built with longevity and flexibility in mind. Modular smart contracts, a normalized data layer, and a modern frontend stack make it straightforward to introduce new features such as advanced analytics, social interactions, and additional NFT use cases. As a result, NFT HUB is well-positioned to serve current creators and collectors while evolving with future requirements without major rework.

