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How to create an NFT marketplace on a blockchain?

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Introduction

Over the past few years, we have seen a paradigm shift in the way people think about ownership and value. With the advent of non-fungible tokens (NFTs), everyone is now able to assign value to digital assets in ways that were not possible before. As a result, the world is witnessing digital collectibles — art, music, video game items, and even tweets — sold for amounts beyond imagination.

> $91.8 million is the price of the most expensive NFT in the world, The Merge. (Barron's)

But there is one curious detail — while one in ten Americans owns an NFT collection, 90% of the Japanese have never heard of the technology at all (BanklessTimes).

This fact proves that the popularity of NFT technology is still gaining traction at a rapid pace. To take advantage of this trend, more businesses are looking to create their own NFT marketplace. However, since tokens are built on blockchain technology, it can be challenging to develop a platform that is both user-friendly and secure.

Hence, in this whitepaper, we would like to introduce the concept of an NFT marketplace and walk readers through the process of creating one with blockchain technology. By the end of this guide, you will clearly understand how to build an NFT marketplace that is secure, reliable, and compliant with all applicable laws and regulations.

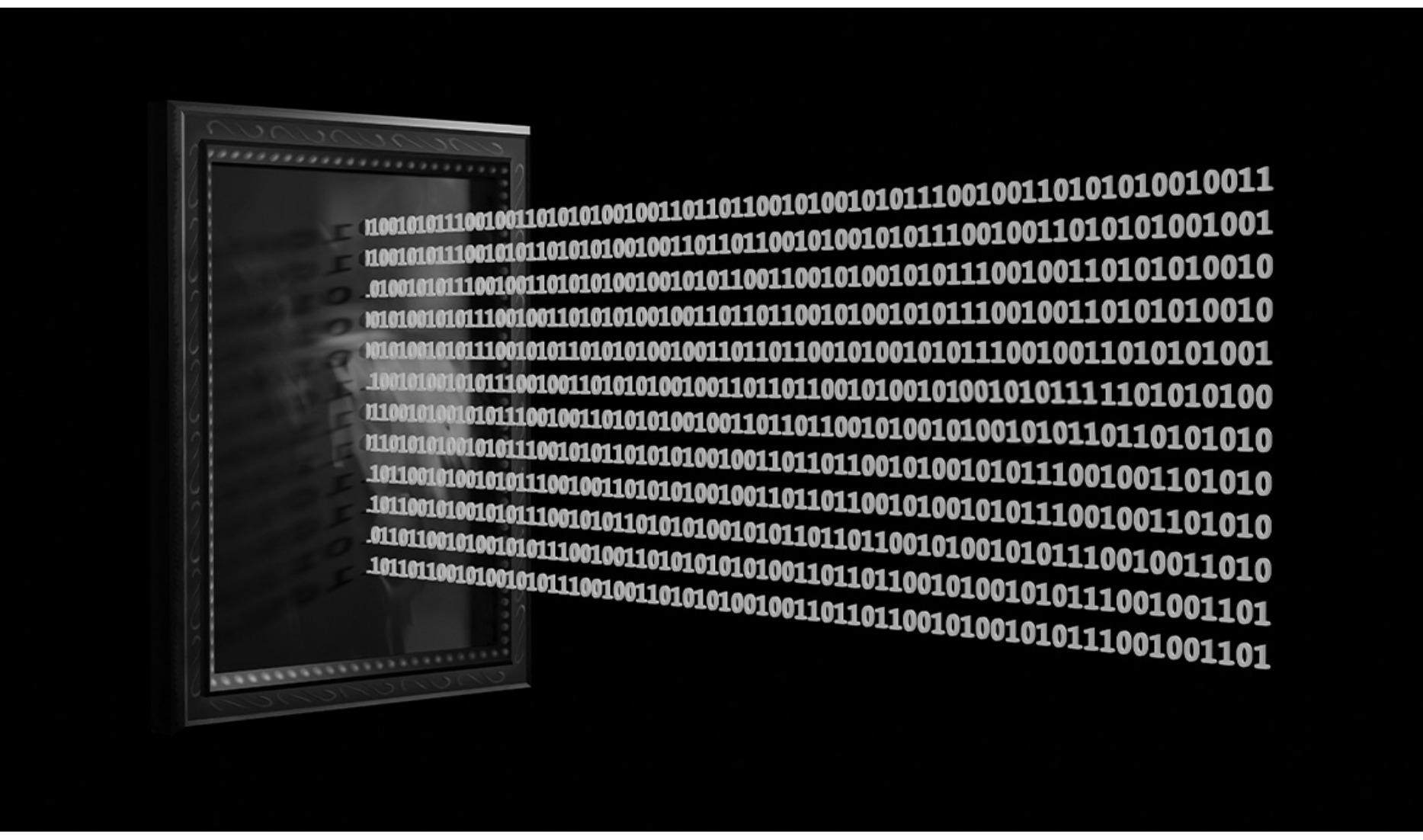
To delve deeper into the subject and see all its intricacies, we have gathered our high-level technical expertise and time-tested experience and provided detailed answers to the following questions:

- What is an NFT marketplace, and how does it function?
- What are the most popular types of NFT marketplaces?
- How to choose a blockchain platform?
- What components should the architecture of an NFT marketplace include?
- How to build an efficient solution?

This whitepaper was created to help everyone involved in the world of digital assets and blockchain technology better understand the nature of these complex concepts and the mechanics of how they interact with each other. As for the target audience of our research, it will be most useful for:

- **Blockchain companies** looking for the latest and most lucrative ways to prosper in the fintech market;
- **Fintech startups** specializing in blockchain development and seeking to create an NFT trading solution;
- **Entrepreneurs and business people** who are eager to learn about the potential of NFT marketplaces.

Thus, this whitepaper addresses the typical concerns of potential investors, professional traders,



What is an NFT marketplace?

This Section provides an overview of the topic. It contains basic definitions and a problem statement.

1. NFT marketplace: the basic definitions

What is an NFT?

A non-fungible token, or an NFT

> *is a digital token that is designed to work as a digital certificate of proprietary rights for physical or virtual assets, such as photos, videos, tweets, codes, etc. (Merehead)*

Blockchain is the technology that powers NFTs, making them unique, extremely secure, and duplication-resistant. This means that in contrast to cryptocurrencies like Bitcoin, which can be traded as equivalents, an NFT cannot be another NFTs of the same kind because of their specific data. Just as no two airline tickets, cars, or boats can be the same. For this reason, we call such items “non-fungible”.

The majority of the existing NFTs run on the Ethereum blockchain, and the ERC-721 standard is commonly used to create them. Due to standardization, NFTs have a fairly high degree of interoperability, which allows blockchains to interact with each other. This provides token owners with the ability to transfer them between different dApps.

The uniqueness and non-fungible nature are not the only specific token properties. Here are some of their other characteristics:

- **Non-interoperability** — each NFT is a separate entity and cannot be transferred or used on other platforms. For example, an NFT minted on the Ethereum blockchain cannot be used on the Flow blockchain.

- **Tradability** — anyone can buy and sell NFTs on supported cryptocurrency markets. Thus, the option to profit from investments or trade tokens for other assets becomes easy and straightforward.

- **Indivisibility** — each digital asset is unique and cannot be divided into smaller units.

- **Authenticity** — smart contracts store creator metadata, token owner information, and transaction history, so it’s easy to find out all the necessary details about any token.

- **Scarcity** — NFTs are often created in limited quantities. For example, an artist can only release a limited number of digital artworks in the form of non-fungible tokens. This makes them more valuable to collectors since the supply is limited.

- **Liquidity** — tokens can be easily traded on various exchanges, which increases their liquidity. Thus, the target audience varies greatly, from first-time traders to seasoned players.

- **Programmability** — like any digital asset, tokens are fully programmable. As a rule, modern NFTs use advanced mechanics, which can include forging, random generation, and crafting. As for their design, there is no limit to what creators can do.

To better understand the value of the burgeoning NFT trend, have a look at some well-known examples of token deals:

- The CryptoPunk #8857 digital image was sold for $6.6 million. It is rare, as it is one of the earliest examples of a NFT, and there are only 88 items in the collection. (Mint)

- The domain name NFTs.com was acquired for $15 million, making it the second-largest domain name sale in the history of NFT transactions. (DomainInvesting)

- The first-ever NFT "Everydays: The First 5000 Days" was valued at $69 million. (Forbes)

- The first tweet written by Twitter CEO Jack Dorsey was sold for $2.9 million. Now, that bid is worth just $280. (CoinDesk)

- Digital sneakers created for an online game are currently selling for as much as $10,000 a pair. (Input)

What is an NFT marketplace?

An NFT marketplace is

> *a platform where people can trade digital assets. NFT marketplaces use a blockchain architecture that creates a read-only record that holds a unique, non-fungible token. (Embroker)*

NFT marketplaces serve as a meeting place for buyers and sellers of digital assets. They provide a global platform for people to trade, mint, track, and manage NFTs.

Such marketplaces are based on blockchain technology, intended to provide a transparent and immutable record of the processes of tokenization and digital asset trading. The most popular open-source blockchain in this industry is Ethereum, which stores and supports tokens.

Transparency of all processes taking place on the NFT marketplace allows each transaction to run seamlessly, as all information about the deal participants is recorded and stored inside the NFT code.

Smart contracts are used for this purpose. Their primary function is to manage, audit, and authorize transactions between sellers and buyers. This high level of transparency also contributes to the authenticity of reviews — they cannot be altered or falsified and will exist in the blockchain forever.

What is an NFT standard?

NFT standards are used to

> *describe how to build non-fungible tokens on a particular blockchain protocol. (koombea)*

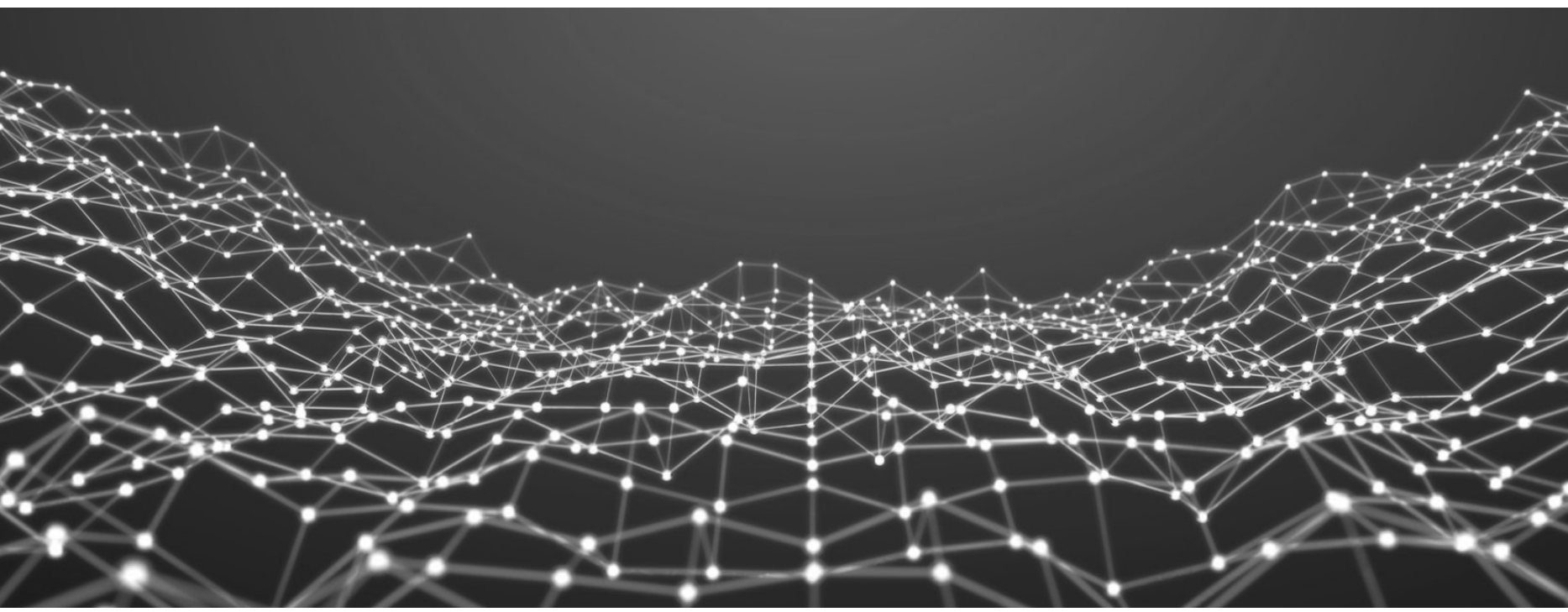
In other words, the NFT standard includes the unique characteristics of a particular token. It is automatically assigned to each digital asset at the moment of its creation, based on information about its age, rarity, and popularity. This gives the NFT a certain value that distinguishes it from other tokens. Hence, each item is unique and cannot be exchanged for any other digital asset, as they have different values.

These days, Ethereum is the most popular blockchain platform for NFTs, offering several NFT standards. Let us take a look at the most common ones:

- **ERC-721** is a free, open-source token standard that describes how to create NFTs on the Ethereum platform. It offers the following functionality: transferring tokens between accounts using the transferFrom method, displaying the current token balance in the account as well as the total supply of tokens available in the network.

- **ERC-1155** is often referred to as "the next generation of the multi-token standard", as it is far more efficient than its ERC-721 counterpart. ERC-1155 significantly speeds up the token creation process by allowing multiple NFTs to be generated and transferred simultaneously. Moreover, any NFT owner can access numerous unique and non-fungible tokens with a single smart contract.

- **BEP (BEP-20, BEP-721, etc.)** is a group of token standards developed by one of the largest cryptocurrency exchanges — Binance — for the BNB Smart Chain platform (BSC). BEP standards serve as equivalents to the Ethereum standards and are compatible with the Ethereum Virtual Machine (EVM).



2. Major types of NFT marketplace platforms

One won't find a non-fungible token available for purchase on traditional cryptocurrency exchanges. Instead, they should visit a specialized virtual marketplace where NFTs are freely traded. Note that such platforms are not equal. Some focus on a specific type of digital assets, while others offer a more general trading space. Here are some of the most common types of platforms with key differences to keep in mind.

Universal NFT marketplace

The universal NFT marketplace is a platform where users can trade different types of digital assets, varying in category, purpose, and style. This kind is the most popular, as it allows every customer to find a token they like without being tied to a specific niche. The target audience of the universal marketplace is fairly diverse — from amateurs to NFT experts.

Examples:

- **OpenSea**

OpenSea is one of the world's most prominent NFT marketplaces powered by Ethereum, where anyone can create, own, and trade digital goods. It's a safe and user-friendly platform with support for over 150 different payment tokens and built-in fraud protection. The OpenSea team is a group of entrepreneurs, engineers, and designers, creating the definitive destination for all things collectibles, including art, game, sport, domain names, and other types of tokens. Their goal it to connect creators with collectors and unlock the full potential of the NFT ecosystem.

- **Magic Eden**

While OpenSea is built on Ethereum, Magic Eden is the largest NFT marketplace running on the Solana blockchain. This feature gives the platform an advantage over its Ethereum-based counterparts, as it charges a flat transaction fee of only 2%. In terms of operation, users of the marketplace can both launch new NFTs and trade on the secondary market. Magic Eden offers a Launchpad feature that allows anyone to mint new tokens. It follows strict standards, and the acceptance rate is just 3%. The platform's main focus is blockchain gaming. It launched a separate service for NFT games on the Solana blockchain called Eden Games.

Exclusive NFT marketplace

This type is called exclusive as it offers unique NFTs for sale, usually works of art issued in a single copy or in a limited quantity per work. Another peculiarity of it is the extremely high value of the tokens. This is closely related to one of its biggest disadvantages — low liquidity due to the small number of works and their high price. The target audience of the exclusive NTF marketplace is mainly collectors of rare works of art.

Examples:

- **SuperRare**

SuperRare is a digital art marketplace built on the Ethereum blockchain. Today it positions itself as a decentralized autonomous organization (DAO) with a community of NFT artists, creators, and collectors in charge. A key feature of this platform is its focus on art-oriented non-fungible tokens. Buyers won't find anything related to sports, music, or gaming assets there. SuperRare is similar to other NFT platforms in its operation. Buyers can mint, trade, and explore high-quality works of art, while their funds are protected by a smart contract.

- **Foundation**

Foundation is another exclusive NFT marketplace focused on digital works of art. The platform facilitates live auctions where anyone can buy, sell, and exchange unique items from NFT art collections. For this purpose, Foundation uses the Ethereum blockchain and smart contracts. A specific feature of this marketplace is that digital artists can only join it by invitation. This means that a person has to be invited by another Foundation user to sell artworks. On the other hand, buyers can immediately explore the offers after signing up, skipping the invitation procedure. The only requirements its users must follow are the possession of a 3.0 wallet with ETH, an Ethereum token.

Specific niche NFT marketplace

A specific niche NFT marketplace is usually dedicated to a particular industry segment. It can be a platform that sells NFT related only to sports, music genres, or a certain online game. Such specialized marketplaces make digital asset trading easier and more convenient for users, as they can effectively track any changes in the market and react to them faster. Bear in mind, that for a specific niche NFT marketplace to run smoothly and drive trading, it should have a sufficiently large user base.

Examples:

- **NBA Top Shot**

NBA Top Shot is an NFT marketplace built on the Flow blockchain. As for its specific niche, the NFTs it trades are basketball-related. If you've ever collected cards of top basketball players, then the way this marketplace functions will be familiar to you. On NBA Top Shot, collectors buy and sell photos and videos of the sport's most significant events. They are called "Moments" and are minted in "Packs", just like classic cards. The Packs, in turn, are minted in "Sets", which are part of "Series". Buyers can use their collectibles to take part in Top Shot challenges to win prizes, unique Moments, and rare Packs.

- **Axie Infinity**

As the name implies, this NFT marketplace was created specifically for the popular game Axie Infinity. The platform is built on Ethereum and offers buyers to purchase various tokens for the game. Users can choose from hundreds of thousands of Axies — digital pets with different abilities and rarity levels. These creatures participate in battles, help explore game worlds, and can breed to create new Axies. In addition, buyers can purchase land and valuable items.

3. How does an NFT marketplace function?

Before we delve into the process of creating an NTF marketplace, let us examine how this type of software works. Most NFT marketplaces function similarly to traditional online stores, such as eBay and Amazon. Users can list their NFTs for sale, while other users browse and purchase tokens they're interested in. However, there are some key differences between traditional and NFT marketplaces.

Blockchain. NFTs are stored on a blockchain, which is secure and transparent, making it ideal for trades involving high-value items. Ethereum is the most popular blockchain for building NFT marketplaces. Other common options include Solana, Polygon, BNB Chain, and Tron.

Smart contracts. NFT marketplaces use smart contracts to facilitate transactions. These are digital contracts stored on a blockchain. They contain all the information about the transaction and automatically execute the terms of the contract when certain conditions are met. For example, when someone buys a token, the smart contract can automatically send it to the buyer and transfer money to the seller. These protocols are hard to alter or delete, meaning they are tamper-proof. Combined with the fact that they are stored on a blockchain, this makes smart contracts extremely secure.

Storefront. For any store, whether it's an online store or an NFT marketplace, it's crucial to have a storefront. Its major purpose is to display information about platform users, token holders, item values, previews, and ratings. The ideal storefront is one that provides the user with all the information they need without having to turn to third-party resources.

Workflow. Most NFT marketplaces share a similar workflow, with users going through certain stages depending on their role (creator or collector): signing up, creating, selling or buying a token. The first step is registration on the platform and connecting a digital wallet. After that, the user can go two different ways:

a) Mint tokens, upload them to the platform, and then sell. To do so, they need to select the payment currency, set the price of the digital asset (fixed price or auction), and place it for sale.

b) Collect tokens. This scenario is simpler — users should pick the NFT they like and buy it. If the seller puts that token up for auction, they'll have to compete for it with other interested parties.

How to select the architecture and the blockchain platform for your project?

This Section provides a high-level description of the solution.

NFTs have been gaining a lot of popularity lately due to their ability to represent digital assets in a unique and immutable way. However, setting up an NFT marketplace where people can trade them is no easy task. Besides the common challenges associated with launching a marketplace, you also need to choose the appropriate architecture and the right blockchain platform to make it run smoothly. In this section, we will look at these issues in detail.

1. NFT marketplace architecture

An NFT marketplace is a complex system made up of numerous components. Before moving on to the development stage, it is necessary to figure out which elements are included in the software architecture and which features should run on the platform as smoothly as possible.

Let us start with the **architecture components**.

Application

It is the marketplace itself: a platform where buyers and sellers can meet to trade NFTs. The app usually has a built-in escrow system to protect every user from fraud.

NFT wallet

This is where buyers and sellers store their NFTs. The wallet is also used to transfer tokens between transaction participants.

NFT metadata

It is a detailed description of the tokens stored on the marketplace. It typically includes the name of the NFT, the date and time of its creation, the true owner, etc.

NFT metadata storage

It is a critical element of the NFT ecosystem infrastructure, used to store token data in a secure, decentralized way. Popular storage methods include: IPFS (InterPlanetary File System), SQL databases, JSON files.

Smart contracts

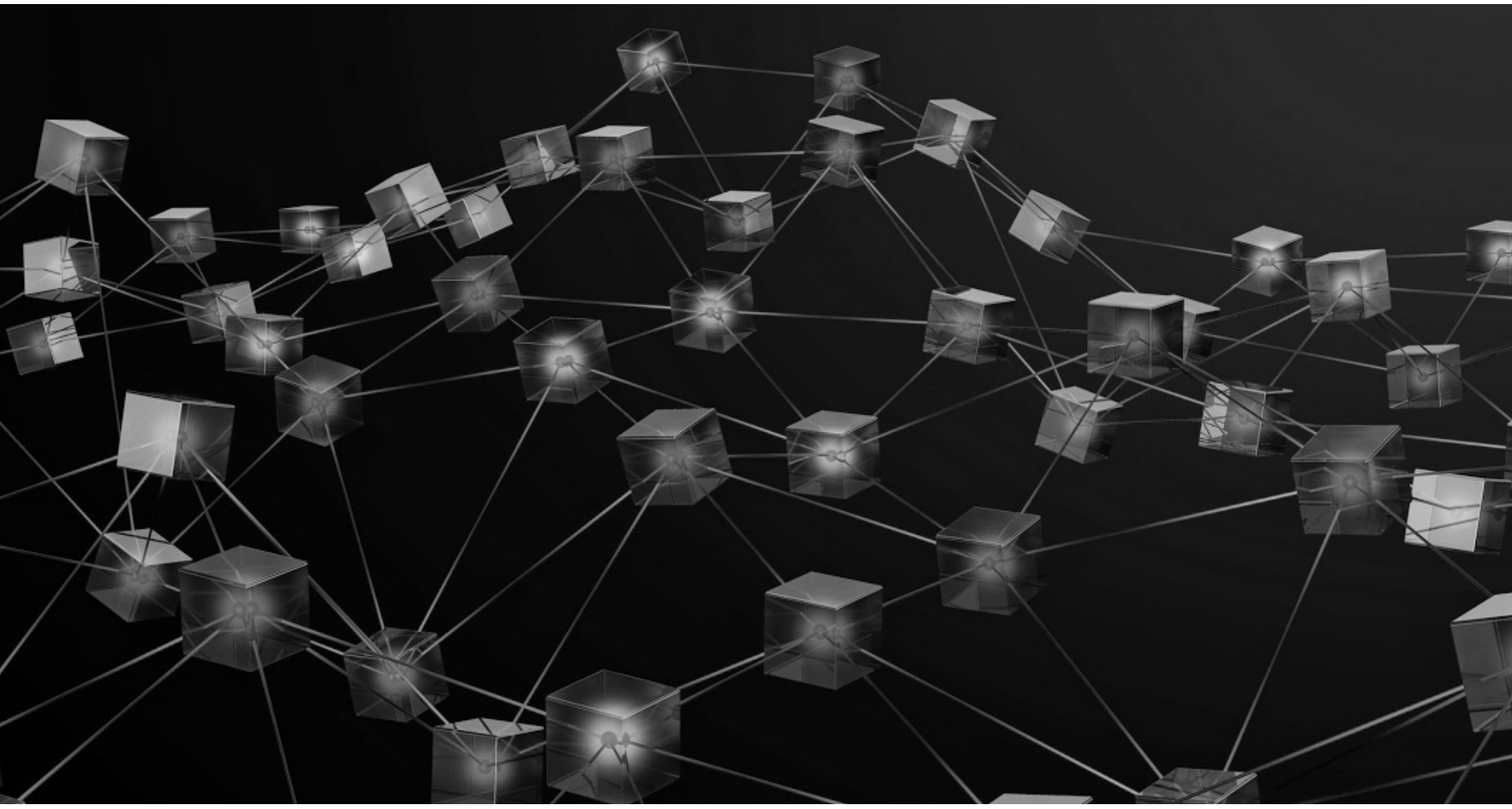
They create a unique identifier for each token using the popular standards ERC-721, ERC-1155, BEP-721, or BEP-1155.

Blockchain integration

The last and most significant thing, which absence makes it impossible to create a fully functional NFT marketplace, is a blockchain. The choice is extensive: public, private, consortium, and hybrid blockchain networks. Keep in mind that most functioning platforms are public. The other options are only suitable for unique purposes. Here's their overview:

	Public	Consortium	Private	Hybrid
What is it?	Anyone anywhere in the world can read and write on the network. The data are verified by each network participant ("node"), thus making it very secure.	Permissions to verify, read, and write on a blockchain are controlled by several predetermined nodes. The choice of these nodes can be different for each entity on the blockchain.	Permissions to read and write data on a blockchain are controlled by a single "highly trusted" organization, the blockchain owner.	It enables organizations to create a private permissioned system alongside a permissionless public system.
Use Cases	Can be used in almost every industry: document validations, cryptocurrency, IoT operations, etc.	Finance, supply chain, research work, etc.	Supply chain, real estate, asset ownership, etc.	Real estate, healthcare, etc.
Access	Independent with full transparency and trust	Controlled access and security	Fully controlled access	Controlled access and high scalability
Advantages	**Independence, transparency, reliability, decentralization** - Secure, as the entire network verifies transactions; - Transparent, as all transactions are made public with individual anonymity.	**Access control, privacy, security** - Efficient, as relatively fewer nodes verify transactions; - Private, as read and write access can be controlled by predetermined nodes; - No consolidation of controlling power.	**Access control, privacy, performance, scalability** - Efficient, as verification is done only by the blockchain owner; - Private, as the owner can control who has read or write access to a blockchain.	**Access control, performance, scalability, cost-effectiveness** - Highly customizable while maintaining integrity, security, and transparency; - It can choose blockchain participants and decide which transactions can be made public.

	Public	Consortium	Private	Hybrid
Disadvantages	**Performance, scalability** - Inefficient, as all nodes need to verify the transaction; - Small blockchain networks may not be secured. May be vulnerable to a 51% Attack.	**Transparency, vulnerability** - It can be hacked if the organization becomes corrupt. Organizations can hide information from users; - If several nodes get hacked, there is a greater chance of vulnerability in the blockchain.	**Trust, lower security, transparency** - Controlling power is centered in a single organization; - Difficult to align many organizations to use the same blockchain; - The number of nodes is limited, so there is a possibility of manipulation.	**Transparency, difficult to develop** - Upgrading can be difficult, and users have no incentive to participate in or contribute to the network; - Because information can be hidden, this type of blockchain isn't completely transparent.



Now, let us move on to the **key features** necessary for the proper functioning of the marketplace and attracting users.

User profile: bio, photo, wallet

Right after signing up to the marketplace, users should have the opportunity to create their profiles and add all the necessary information:

- Insert a name, date of birth, location;
- Upload a photo;
- Connect a digital wallet;
- Choose interests.

Storefront

Storefront is one of the most crucial features that every NFT marketplace should have. It allows users to view information about all trades on the platform: offers, owners, price history, previews, bids, and more.

NFT information: price, rating, reviews

Separate pages for each NFT with detailed information about it should be part of the storefront. This feature allows users to check the current price and the rating of a certain token, look through the purchase history, and read user reviews.

Interaction with NFTs: create, buy, sell, bid

The platform should include token interaction functionality that grants every user of the marketplace the ability to create, sell, and buy NFTs, as well as participate in the auction and place bids. Other essential points are copyright issues and terms of sale. They must be clearly defined to avoid possible conflicts between users in the future.

Search function and filters

To enable buyers to find the specific type of token they are looking for, the NFT marketplace should have search and filter features. They can significantly reduce the time between selecting an NFT and the actual purchase. Users should be able to search and filter tokens by the following categories:

- Name;
- Price;
- Author;
- Collection;
- Tag;
- Time of creation;
- Rating.

Payment system

If you want your platform to function properly, you must establish payment support. The NFT marketplace should allow users to connect their crypto wallet, through which they can make payments in one or more cryptocurrencies, send, receive, and store digital assets.

Extra features

To attract users and overtake competitors, you need to create not just another NFT marketplace, but a new platform with unique functionality. More features to add:

- **Multichain support**. It's the ability of the marketplace to support transactions on multiple blockchain platforms, allowing users to freely move their NFTs between them. This gives buyers more choice and flexibility when it comes to their tokens and allows product owners to tap into new markets and user bases.

- **Rewards for purchases**. The format can range from cashback for buying a token to access to additional content.

- **NFT templates**. They will be useful for new users of the platform, making the process of NFT creation easier. Note that this feature should be simple and straightforward, preferably with fields to fill in the details of the desired token.

- **Airdrops**. It is a distribution of a token, usually for free. It can be used to drive adoption of a new platform or to promote new features and updates. Users can get airdrops for completing a simple task, such as listing their NFTs on the marketplace, tagging friends on social media, or installing an app.

- **Community forums**. Some platforms have these forums where users can discuss anything related to NFTs. It is a convenient place to ask questions, get advice, and connect with other collectors and creators.

2. Blockchain platforms

When picking a blockchain platform for building an NFT marketplace, there are several things to consider. The first is scalability. Will the platform be able to handle a large number of transactions? The second is price. How much will it cost to mint an NFT or buy and sell one? And finally, security. How safe and easy is the platform to use?

Take a look at the five industry leaders and pick the one that will work for you and your future marketplace:

Ethereum

Bitcoin's main competitor and the most popular open-source platform for NFT marketplaces is Ethereum. It was founded in 2015 and since then has been widely used for blockchain development, enabling the creation of smart contracts and dApps. The cryptocurrency that powers the Ethereum blockchain is ether (ETH).

September 2022 brought Ethereum "The Merge", a significant update that reduced its power consumption by 99.5%. Before September, the Ethereum blockchain relied on Proof of Work (PoW), which is

> *a consensus mechanism used to confirm that network participants, called miners, calculate valid alphanumeric codes — called hashes — to verify bitcoin transactions and add the next block to the blockchain. (Insider)*

After the update, Ethereum switched to the Proof of Stake mechanism, which is

> *a consensus mechanism that helps choose which participants get to handle this lucrative task — lucrative because the chosen ones are rewarded with new crypto if they accurately validate the new data and don't cheat the system. (Forbes)*

Proof of Stake is less power consuming and more suitable for implementing new scaling solutions than the aforementioned Proof of Work approach. It speeds up minting new blocks and conducting transactions and decreases the cost of these operations.

As for the disadvantages of the Ethereum blockchain, the major one is its insufficient scalability. Currently, Ethereum can process 15 to 30 transactions per second. If the transaction volume increases, the network experiences congestion, resulting in transaction completion delays and exorbitant fees. This leads to another disadvantage: high transaction fees. Even after recent updates, they average $15 (as of December 2022).

These problems do not significantly affect Ethereum's rating, and numerous companies choose this blockchain platform to create NFT marketplaces. The key reasons for this choice are the extensive user base and ecosystem with a broad range of tools, technologies, etc.

Prominent Ethereum-based marketplaces are:

- Rarible;
- CryptoKitties;
- Foundation.

Polygon

Polygon is a well-known "second-tier" blockchain protocol built on top of Ethereum to address its difficulties by ensuring faster and cheaper transactions. It combines the security, liquidity, and compatibility of Ethereum with the scalability and adaptability of sidechains — discrete blockchains linked to the main blockchain. The key facts about this platform:

- Polygon can conduct up to 65,000 transactions per second, with a fee of $0.01 per one.
- The native cryptocurrency is MATIC. It's an ERC-20 token compatible with Ethereum-based digital currencies. MATIC's major tasks are processing exchange payments and commissions, as well as storing tokens to ensure the security of the Polygon network.
- This platform uses a modified PoS consensus mechanism.

Polygon was created to offer a solution for building blockchain networks that are not fenced off from each other, but can interconnect. So far, Polygon has shown excellent results in the NFT market: developers have created over 20,000 dApps based on it.

Prominent Polygon-based platforms are:

- NFTrade;
- Treasureland;
- Refinable.

Solana

Solana was founded in 2020 and is now a direct competitor to Ethereum. It is also an open-source public blockchain platform with its digital currency SOL. Solana's advantages over Ethereum include:

- Higher transaction processing speed and lower transaction fees;
- The Proof of History (PoH) mechanism, which is

  a sequence of computation that can provide a way to cryptographically verify passage of time between two events. (Consensus)

  It helps to significantly reduce the time for transaction processing.
- The Sealevel concept, which is a runtime environment capable of processing a multitude of smart contracts concurrently.

All these features make Solana a highly scalable blockchain network with the following key metrics:

- 50,000 transactions per second is its maximum throughput;
- $0.00025 is the average fee per transaction;
- <1 second is a block time and completion.

Prominent Solana-based platforms are:

- Solanart;
- Solsea;
- Metaplex.

BNB Chain

Founded in 2020, BNB Chain is a rebranding of Binance Smart Chain (BSC), which comprises BNB Beacon Chain and BNB Smart Chain. The two platforms serve different purposes:

- BNB Beacon Chain is used for management, i.e., voting and betting.
- BNB Smart Chain is used to work with the Ethereum Virtual Machine and perform consensus mechanisms. It relies on the Proof of Staked Authority (PoSA), which combines Proof of Authority (PoA) and Delegated Proof of Stake (DPoS).

  DPoS is a staking model where interested parties put up a stake, or some amount of the network's native token, in hopes of becoming a "validator", who validate transactions and create blocks. (Babypips)

  These mechanisms help reduce block validation time and transaction fees.

With this approach, each transaction in the BNB Chain environment requires an average of 0.1% commission and takes no more than 5 seconds to create a block.

Despite these advantages, BNB Chain is often criticized for being a centralized platform with complex and CPU-intensive verification processes and node operation.

Prominent BNB Chain-based platforms are:

- Element;
- NFTb;
- Pentas.

Tron

Another well-known competitor to Ethereum is Tron, created in 2017. It's an open-source platform running on its own cryptocurrency, Tronix or TRX. Users praise Tron for keeping all data completely free and not controlled by a central authority. An added benefit is that anyone who publishes their content can receive a TRX token as a reward.

Key facts about this platform:

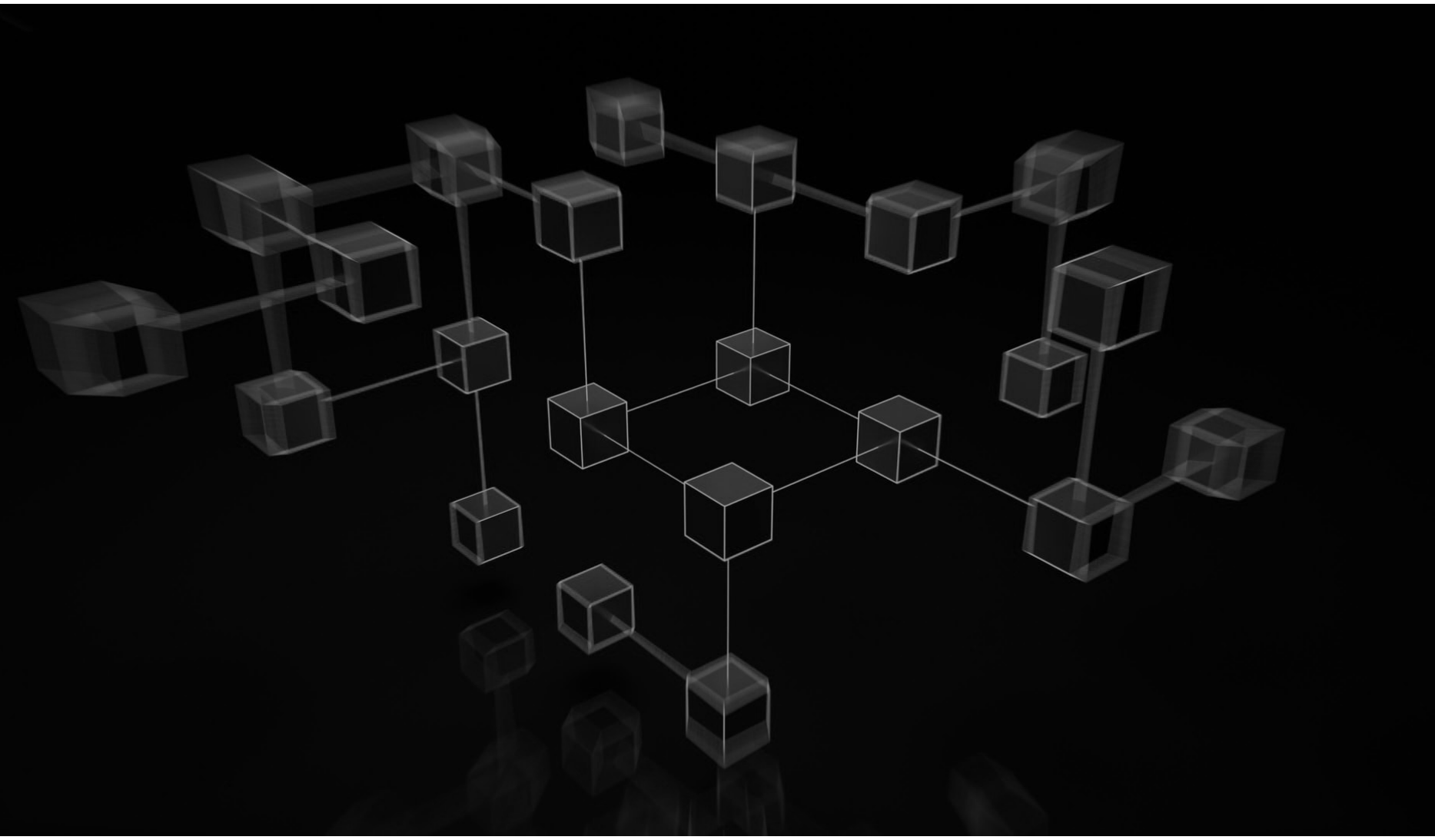
- Tron uses the DPoS consensus method.
- The platform executes smart contracts through the Tron Virtual Machine. It has a three-tiered architecture for allocating resources among TRX holders.

- The Tron ecosystem consists of a DEX (decentralized exchange), a decentralized oracle, a blockchain explorer, a wallet, and a lending platform.
- The transaction processing speed is over 2,000 transactions per second.

Tron is no exception to criticism. Users often compare it to other platforms, scolding it for borrowing more than creating something new. But this is only partially true, as Tron tries to solve known problems of other blockchain platforms by increasing throughput, performance, scalability, and availability.

Prominent Tron-based platforms are:

- Wink;
- JustSwap;
- Luminous.



Step-by-step guide to NFT marketplace development

This Section contains a step-by-step guideline for NFT marketplace creation. Here we also provide information on the required specialists and the time of development.

Having studied the theory, we need to move on to practice, namely the process of NFT marketplace development and the stages it includes. To do this, we have combined the theoretical data from the previous sections and our time-tested experience in the development of blockchain solutions. Thus, the project roadmap comprises four stages. Let us take a closer look at them.

1. Pre-study

The pre-study stage of software development is devoted to a high-level analysis of the project and planning of the required technical architecture. The primary goal of this stage is to understand what the final product should do and what functionality it should have. The outcome of the pre-study is a product specification document containing a detailed description of the software to be developed.

The main goals of the stage include:

Service vision

- Defining the target audience for the software, use cases, user journeys, and conducting the required analysis;
- Defining the key functionality for the target group (think through the user acquisition process);
- Defining user channels (decide whether it will be a single-channel or omnichannel product);
- Thinking through the UI/UX design concept (general vision).

High-level feature matrix

- Defining the technical structure;
- Thinking through the functionality (define minimal requirements and must-have features);
- Conducting the gap analysis of the marketplace API (find out what features and functions of the marketplace is capable to implement and define the functionality to be developed from scratch).

Advanced technical vision

- Thinking through the tech stack;
- Creating a list of technological components;
- Creating a high-level architecture plan (including blockchain technology, required integrations, and APIs);
- Elaborating the performance expectations.

2. The POC stage

The Proof-of-Concept stage focuses on prototyping. It allows us to test crucial architectural features and see if we are ready to scale the development. The purpose of the prototype is to test the feasibility of the proposed software solution, not to create a complete product.

The main goals of the stage include:

- Development and implementation of 1 or 2 features (product design is not crucial at this stage, as the focus is on testing the software's performance);
- Performance testing (it is necessary to check how orders are executed, how fast the API works, and how NFTs are placed);
- Systematization of the obtained results.

After creating the prototype, we will test it with users to collect feedback. Based on the results, we will introduce changes to the prototype and continue testing until the software is deemed feasible. If the Proof-of-Concept is successful, the software development process can move on to the next stage.

3. The MVP stage

This stage is the most crucial for software development. During it, the team works to create a Minimum Viable Product. The Economic Times defines it as

> *a development technique in which a new product is introduced in the market with basic features, but enough to get the attention of the consumers. The final product is released in the market only after getting sufficient feedback from the product's initial users.*

The MVP should not be confused with the prototype, since the two concepts are completely different. The prototype is usually a rough version of the final product, while the MVP is fully functioning software with a minimal number of features released to early users to get their

feedback and iterate on the product.

The main goals of the stage include:

- Development and release of the MVP functional features and their testing;
- Implementation of the UI/UX design.

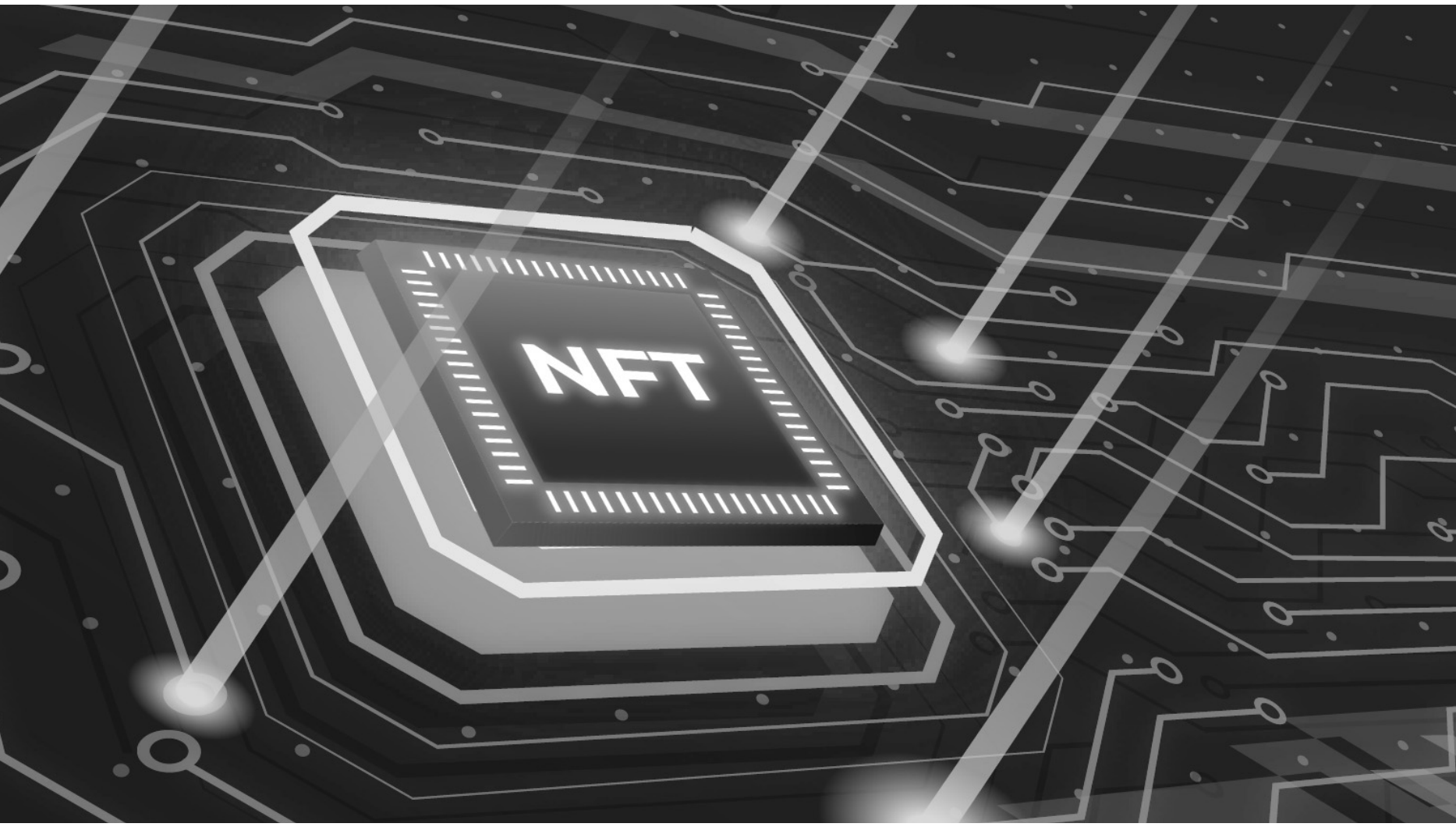
4. The first release

At this stage, we get a full-scale product ready to be released to the public for the first time. This can be done in a number of ways, such as through beta testing, a public preview, or a general release.

The main goals of the stage include:

- Final preparations;
- Further analysis, conducted by monitoring progress, collecting feedback, and addressing issues.

To get a better understanding of the NFT marketplace development process, take a look at the table below. It illustrates the main stages of product creation and provides additional information about the development timeline and the required specialists.



Stage	Duration	Major processes	Team members
Pre-study	2–4 weeks	**Service vision** (Defining the target audience, use cases, user journeys, user channels, UI/UX design); **High-level feature matrix** (Defining the technical structure, functionality, conducting the gap analysis); **Advanced technical vision** (Defining the tech stack, technological components, architecture).	• Product manager; • Business system analyst; • Technical architect.
POC	4 weeks	Development and implementation of 1 or 2 features, performance testing, analyzing results.	• Business system analyst; • Project manager; • Technical architect; • Mobile developer; • Web developer; • Back-end developer; • UI/UX designer; • QA engineer.
MVP	10–12 weeks	MVP development and release, testing, UI/UX design.	• Business system analyst; • Project manager; • Technical architect; • Mobile developer; • Web developer; • Back-end developer; • UI/UX designer; • QA engineer.
R1	10–12 weeks	Preparing a full-scale product for the first release to the public.	• Business system analyst; • Project manager; • Technical architect; • Mobile developer; • Web developer; • Back-end developer; • UI/UX designer; • QA engineer.

Conclusion

A quick summary of the topic, final estimates, and strategic recommendations before you go.

In this whitepaper, we have shared with you our insights on how to create a blockchain-based NFT marketplace and outlined the peculiarities you should pay attention to. We have taken an in-depth look at what such a platform is, what components it includes, and what types of marketplaces exist. We have also dived deep into the software development process and covered its four essential stages.

Please note that the project roadmap presented in this document is not the only possible option, which can vary depending on the complexity of your product and country of residence.

Below are some highlights and strategic recommendations from this whitepaper that we would like to give extra focus before you go.

1. Development costs

The cost of developing an NFT marketplace can vary depending on a number of factors, such as the size and complexity of the platform, the features and functionality, and the development team you partner with. In general, you can expect to pay anywhere from $50,000 to $350,000 for a project. If you want to add support for multiple blockchain platforms, unique functionality, and UI/UX design, invest more in QA, marketing, and other services, you will have to pay more. For detailed product cost estimation, please contact us.

2. Multichain NFT marketplace

There is one aspect of NFT marketplace development often overlooked by newcomers: it is not necessary to work on one blockchain. If you are going to develop this kind of product, the limitations of the chosen blockchain will affect the functionality of the software. Instead, it's more beneficial to build a multichain NFT marketplace integrated with several blockchain networks as well as various digital wallets. By creating a product compatible with multiple blockchains, you will greatly expand the capabilities of your solution, reduce transaction costs, and tap into new markets.

3. SDK or custom NFT marketplace?

The eternal question for anyone who wants to create an NFT marketplace is whether to use an SDK or build it from scratch. At first glance, the first option seems easier and more reliable. These days, the global leaders like OpenSea offer their own SDKs. They allow anyone to create a product with a similar infrastructure and custom design. This option enables a faster launch of a platform, eliminates the need to deploy smart contracts, and requires only a blockchain expert and a few developers with experience in SDK setup. What are the pitfalls? Customization and flexibility.

Using an off-the-shelf solution isn't suitable for every project. If your goal is to create a niche NFT marketplace, e.g., the one dedicated to real estate, the ability to customize it or expand its functionality will be highly limited.

This is the major reason why custom development is a better alternative. Only a tailor-made solution will fully meet your requirements, and only experienced developers can build a high-end NFT marketplace. Below are some other benefits you'll get:

- Your idea will be turned into a well-designed project;
- A team of professionals with experience in blockchain software development and profound knowledge of all possible issues will be at your disposal;
- You will get access to a maintenance and support option to keep your solution up to date and stay ahead of the competition.

About Qulix

Custom software development company operating globally

Qulix is an international custom software development company delivering quality software solutions. Since 2000, we have been rendering top-notch development and QA services to our 200+ clients from all over the world. Our expertise covers all the stages of the SDLC, which include concept design, architecture design, code development, quality assurance, support, and more.

Qulix delivers turn-key and custom software projects for banking, finance, insurance, multi-media, and other areas. The list of services that we offer embraces back-end and web app development, mobile and cloud app development, QA services, UI/UX design, and DevOps.

Find more of our best practices by visiting our blog or website.

Please contact us, and we will help you define the goals and requirements for your project. Let us together discuss its functional features, split it into stages, and create the next-gen NFT marketplace on a blockchain.

tel: +44 151 528 8015 **email:** request@qulix.com

UK:
Oakwood, Dunstan Lane, Burton, Neston, Cheshire, United Kingdom, CH64 8TQ

Poland:
Braniborska 40, 53–680 Wrocław, Poland

Uzbekistan:
130 Mustakillik Avenue, Mirzo-Ulugbek District, Tashkent, Uzbekistan, 100077