

# Platform for Support and Financing of Startups. Server Application and Control Panel

Bobrov Vasiliiy

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Higher School of Economics  
Moscow, Russian Federation  
vebobrov@edu.hse.ru

**Abstract** — Startups are important as they often bring new ideas and innovations to the market. They can challenge established industries with new products, services, and business models, and are often founded with a fresh perspective on existing problems or new ideas that have not been explored before. Despite the variety of existing software products that automate the process of financing innovative projects, few of them offer extended support of the full development cycle and resource management. The current paper overviews the idea and the process of development of such a system. It will specifically lay out the structure of the server part of the system - the part that is the single source of truth for all the other parts - as well as the control panel that provides a user interface for complex data manipulation.

**Keywords** — *startups; crowdfunding; Smart Contracts; NFT tokens*

## I. INTRODUCTION

The role of startups in the economy is crucial because they drive innovation, create new jobs, and contribute to economic growth [1]. Today there are many automation systems that ensure transparent and safe processes of funding startups.

However, there is often very little control over how the money gathered is actually being spent in the process of development. This is why the focus of our system is not only the automation of the financing stage of startups. The problem that our platform is trying to solve is also the problem of providing support for the actual development of the products after the financing stage.

One way of organising the financing stage of startups is crowdfunding, and it is the mechanism that we chose to use. The development part is going to be automated by allowing developer teams to join the platform and take on projects that have received sufficient financing. This can be achieved with strong level of security through leveraging Smart Contracts and NFT tokens, which is a modern way to manage transactions transparently and safely.

Our attempt on ensuring the automation of processes throughout the full startup live cycle is what makes our platform unique. The server application for this platform is expected to be a fully functioning backend that offers a clean and straightforward interface for all the other components of the system to manipulate the entities and data structures that

are parts of the model we chose to use. It is also crucial to provide a control panel that can be used for moderation purposes as well as monitoring the current state of the system and statistics.

This paper overviews the primary workflow of the system, then explores the funding problem followed by description of chosen transactional mechanism. Then the ownership equity solution is described as well as the data persistence layer and server-side rendering technique.

## II. OVERVIEW

The short description of the main pipeline of the system is the following: a user creates a startup, the startup is being rated, the startup receives funding, the investors choose a development team that is expected to work on the project, the project is being split to sprints, the developers work on the project sprint by sprint, the project closes.

While there are many aspects to this that deserve closer investigation, this paper is going to focus on the most “upper-layer” ones.

## III. FUNDING

The first step for every startup is to acquire necessary resources in order to implement the idea. It is an important step that often definitive as to whether the project is going to be successful. This is why methods of funding startups must be chosen with caution.

The key characteristic that is required for our system to be useful is easy access to startups and investments. Paul Belleflamme, Thomas Lambert and Armin Schwenbacher describe in their work [2] how crowdfunding can provide entrepreneurs with access to a wider pool of potential investors than traditional financing methods, which can increase the chances of finding investors who are passionate about the project and willing to provide funding.

It is also the case that crowdfunding enables “validation on demand”, which means that startups can test the market and validate demand for their product or service before investing significant resources in development. Moreover, it gives investors flexibility in choosing their funding options, from small contributions to larger investments.

This is why we think that crowdfunding is the best option for our system as a financing mechanism. And with use of modern technology we can exploit the benefits of this method even more effectively. The server application is going to implement the crowdfunding logic for the client application to access via HTTP.

#### IV. TRANSACTIONS

The choice of technology for automating financial transactions plays a significant role as well, because this part is the most sensitive to insecurities. With the increasing popularity of blockchain technology it is only appropriate to consider looking for the solution there.

As shown in studies, Smart Contracts based on blockchain technology are quite fitting for use in crowdfunding [3]. Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code. They operate on a blockchain, which is a decentralized system that records transactions in a secure and transparent manner [4]. Once a Smart Contract is deployed on the blockchain, it can't be altered, and it automatically enforces the terms of the contract without the need for intermediaries or third parties.

It suites the purpose of our system well and is very beneficial, because for a large number of investors potentially involved the investment operation can be fully automated, so there isn't additional bureaucratic overhead. The only thing that is required is a cryptocurrency wallet. Furthermore, the developer teams will receive payment via Smart Contracts as well, so all financial operations will be automated as described above.

The Smart Contracts will be stored and executed on the Ethereum platform, while the server application can act as a proxy for other applications to access the transactions.

#### V. OWNERSHIP EQUITY

As soon as Smart Contracts are established as the tool for performing transactions, the question arises - what will represent the ownership in the projects on the blockchain? Our choice is NFT tokens.

As described in the study by Sean Basu, Kimaya Basu and Thomas H. Austin [5], NFT tokens can be used to track ownership information and can be managed via Smart Contracts. On our platform NFT will be used as ownership equity. Once an investor donates a certain amount in cryptocurrency, an NFT token of corresponding rank will be received by them.

At any point in time the shares of a given investor in a given startup can be calculated based on the NFT. The tokens can later be sold on secondary market within the system.

The server application will guarantee the correct interaction with blockchain while providing the data for the client applications via HTTP and Web Sockets.

#### VI. DATA PERSISTENCE

While the backend application is the single source of truth to all the system, there is an exception to this generalisation. With our use of Smart Contracts, all transactional data is going to be stored on the blockchain.

The article [6] shows why it is important to recognise the actual source of truth in development in terms of where the data originates. For our platform this means that the real source of truth for that specific data is the blockchain, and the server application can only provide as much as a cache for that data.

However, cache management is often described as one of the most complex tasks in computer science. Therefore, it is important to only apply it when necessary. Caching increases the speed of data read, but the highest possible speed of data read is not crucial in many cases. It is often a good tradeoff to sacrifice a little speed for reducing complexity, and this is why in our system in most cases the server should act merely as a proxy for accessing transactional data.

#### VII. SERVER-SIDE RENDERING

Even though the main part of this work is the server application, the control panel is also essential. Its goal is to provide extensive statistical information and allow shortcuts for data manipulation and processes management.

In order to make it more accessible, the decision was made to make it a server-rendered application, which means that the actual page is rendered on the server rather than on the client [7]. It helps achieve better load times and optimise user experience.

But it is also important to load data even faster once small changes of the persisted state occur. There is no need for full server page re-rendering in those cases, so the best way to achieve instant loads is AJAX requests.

There is a tool that allows such a complex strategy - it is a javascript framework Remix [8]. This is the instrument that will be used for building both the server application and control panel, because it is suitable for both.

Remix also offers an smart automatic system of request cancellation. Given the financial nature of our platform this is an important feature that is highly beneficial to leverage in our circumstances. The request cancellation is very difficult to do manually, but is crucial for the user interface to function correctly and Remix provides it for us for free.

#### VIII. CONCLUSION

To summarise, the uniqueness of the platform can be achieved via use of appropriate modern methods and technologies. Not only will it allow the full cycle of startup creation, crowdfunding, development and management, but it will also benefit from security and transparency that blockchain, Smart Contracts and NFT enable.

Crowdfunding allows the platform to attract more investors and startups, because it makes it easier to invest and therefore, to receive investments. Smart Contracts eliminate the manual work and human factor to a great extent and grant increased stability of the financial aspect of the system. NFT tokens act as ownership equity and combine well with the blockchain approach.

Finally, with correct modelling of data persistence and use of server-side rendering both server application and control panel can be a powerful foundation for the whole platform.

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