HashUp Whitepaper

Decentralisation of game and software distribution

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Abstract

The early days of computer games were associated with cartridges, which carried software and licences and were difficult to copy. They could be traded or resold. Over time they have been superseded by newer media supported by consoles and personal computers which today face a new form of distribution offered by the large download platforms. These platforms, having taken over a large part of the market, have imposed their distribution conditions, significantly limiting the possibilities of game developers and players.

We believe that it is possible to create a world of free software distribution, where every creator can distribute their software protected from illegal copying and everyone can buy it at a price set by the free market. We want to move the old world of cartridges into the digital age, eliminating geographical barriers, intermediaries and different payment systems, combining the best features of physical and digital distribution in a new, unprecedented form. To this end, we will use blockchain technology and smart contracts which will shape the market for software distribution, including games, in a fairer, more efficient and more transparent way.

HashUp is the first **decentralised** open source **software distribution platform** implementing digital token models into the world of software publishing and distribution. HashUp is creating brand new digital media for software licenses using decentralised finance. By combining the advantages of physical and digital software licence media, a digital game **cartridge** has been developed. The digital **cartridge** allows a **free exchange of digital copies of the licence**, which in turn leads to a free-market price setting and the creation of a **secondary market** where the game creator earns money. The digital **cartridge** is being developed on the **GameContract.io** platform. HashUp does not take any commission for distribution, as it is not an intermediary between Creators and Players. All the rules of the aftermarket are defined by the creators themselves who can also turn it off, which would be in this respect similar to the current digital distribution model (where the distributor is the only one to send the license). Cartridges are listed and priced by **GameCap.io**. All cartridge exchanges and player game libraries are transparent and visible on **Gamexplorer.io.** The document that publicly describes the rules of the game and provides the game description is GamePaper. **GamePaper.io** is a platform for community game fundraising. At the same time, HashUp is introducing a token for software exchange: **#** (that is hash). Our aim is to decentralise the distribution of games and software. Our licence carriers allow the exchange of software in P2P form. Thanks to HashUp, players will enjoy the software at a lower price and the creators will earn more money thanks to decentralised financing.

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1. Introduction

Physical media for software licenses such as cartridges and CDs allow the games to be exchanged freely after purchase. It is the creators who suffer as they are unable to control or profit from the physical secondary market. At the same time, an illegal software market has emerged where pirated copies of titles flourish, demotivating software developers to develop their software. The result was that prices had to be constantly raised, making software (including games) expensive. As a result, the incentive to illegally obtain copies of software was further strengthened, clogging up the whole mechanism.

One of the effects of digitisation is the development of digital distribution of goods - including software, which is characterised above all by convenience - software has been freed from its physical medium. With the loss of this tangible nature, however, we have lost the proprietary nature of the software licence purchased. Consequently, we cannot exchange software or sell it on the secondary market.

The blockchain technology makes it possible to transfer the regularities of the physical world to the digital world, the best proof of which is Bitcoin[2] created by Satoshi Nakamoto in 2008. The cryptocurrency combines the advantages of both worlds, transferring the features of a physical wallet to its digital form, without any intermediaries. A natural step in software development and distribution is to use the blockchain technology to facilitate trading and to create new market opportunities for both players and creators. This solution has allowed the development of decentralised digital media for software licences:

- the principles of secondary trading are freely defined by the creators;
- they cannot be disrupted;
- no intermediary is required in the distribution process.

It is the creators who create their own #cartridges and are their own publishers and distributors. The sold media goes to the buying players directly from the creator, without the participation of HashUp, which is only the provider of the tool for free software publishing. HashUp bridges the gap between the capabilities of the blockchain technology and the constantly growing market for software distribution - to the benefit of all trading parties.

Examples of problems that HashUp solves:

- Why is there an intermediary between creators and players?
- Why do I, as the creator, have to share the profits with the distributor?
- Why cannot I, as the creator, create my own rules for trading licences for my game?
- Why, as a user/gamer, am I not the owner of a digital software medium?
- Why cannot I send a game I have bought to a friend?
- Why can I not buy the game for what it is actually worth, but have to accept the price imposed by the intermediaries?
- Why cannot I resell a game that I no longer want to play?
- Why cannot I make money from being one of the first players of a game before it has even gained much popularity?

1.1 What do we mean by a free software/game market?

The consequence of having digital media for software is the emergence of a free market where the price of games is determined by free market demand and supply. Demand is created by players buying games and supply by game developers. It is the creator in such a market who becomes the **dictator of supply** because it is up to him/her how many software licences he/she makes available to the market. Currently, the creator is only the **dictator of the price** because it is up to the creator to decide the price on the day

[2] Satoshi Nakamoto: *Bitcoin: A Peer-to-Peer Electronic Cash System*. https://bitcoin.org/bitcoin.pdf, 2008

of release or any promotions. In addition, this role often falls to distributors or publishers, which further complicates the situation. The creator in the free software market developed by HashUp earns much more than with a centralised distributor with the same number of buyers because decentralised finance is used to set the price and operate the free market. **By eliminating intermediaries, it is possible to lower the price of the game for players and increase profits for creators.**

Our solution offers a much more efficient software distribution model where players buy games at the **real market price** and own the digital medium, and the creators earn more through decentralised finance and free market trading. This is therefore a win-win situation for both parties in the market. Mass adoption of this distribution model is only a matter of time due to its cost-effectiveness for creators and players.

1.2 Problems facing the games and software industry

The software market has been dominated by a few centralised distributors who freely create the terms of trade - including their commissions. Correctly defining the problems that exist in the software market will allow a better understanding of how important and necessary decentralised distribution is. Many of the problems of the games industry are a consequence of the lack of a digital medium and the centralisation of software distribution.

The problem of centralising software distribution can only be solved in one way - by decentralising it. Our aim is to re-establish an aftermarket for software in a new form, whereby creators not only do not lose (as was the case with pirated copies), but gain by controlling the conditions of this trade.

1.2.1 The problem of the lack of a digital licence carrier and the absence of an aftermarket

Currently, digital distribution works in such a way that the games purchased by a user are linked to that user's account. In practice, there is no digital medium for software licences that can be disposed of - for example, in the form of an exchange. No possibility of exchange means there is no aftermarket. Nowadays, when players buy a game, they do not own it as they did back in the 1990s. Therefore they cannot lend or re-sell it. HashUp solves this problem by creating a completely new, decentralised digital licence medium that, while not being physical, can be owned.

1.2.2 The problem of the absence of a free market

Due to the current market conditions, we intuitively think of digital goods in terms of creating an infinite number of copies of those goods. Such a model cannot be transferred to the free market, i.e. the pricing of games by means of supply and demand - because the supply of such digital goods would in theory be infinite. This makes it impossible to set a price in a natural way.

The creators are intuitively afraid of the free market because of the memories of the 1990s when they lost in real terms on direct player-to-player exchange, bypassing the creators of the game and reducing their profit. Decentralised finance provides a completely new perspective on this situation. Thanks to DeFi the creator earns more than on the former physical market because as the issuer of his/her own digital game cartridge he/she sets the "rules of the game". - undeniable rules of market trading in his/her game. From being merely the author of the software he/she becomes the architect of the sub-market of his/her game. This significantly changes the existing model of functioning not only of the software market, but of all goods in general.

Another problem resulting from the lack of a free market is the inability of players to punish creators, which leads to a lower quality of products. The situation with GTA Remastered, where the developers sold the game at $60 and players were unable to reduce the price by selling out after buying the games illustrates the problem accurately. In a free market such a situation is unthinkable, which is why the creators of a game that allows secondary trading to say: **my game is of good quality, I am not afraid**

that the price will drop. In the long term, poor games will appear in centralised distributions and good games in decentralised ones.

1.2.3 The problem of strong intermediaries and high commissions

For the opportunity to sell software on centralised platforms, their operators charge up to as much as 30% of the sale value of the title[3]. This means that an independent creator selling three copies of a game earns as much as if he sold only two, while he/she bears most of the costs of the production cycle of the title. The shop in this case is the intermediary between the creator and the player.

HashUp solves the problem of intermediaries in software exchanges by using the first decentralised digital medium, a blockchain-based cartridge that enables the direct exchange of gaming licences between users, eliminating the need for intermediary commission costs. Thanks to the possibilities of the blockchain technology, intermediaries are no longer necessary.

1.2.4 The problem of multiple distributions

Another challenge in the games industry is a phenomenon that will grow over time - the problem of multiple distributions. Because of the high commissions, every large publisher will be forced to try to create and maintain its own store with its own software which is technologically no different from the stores from which those publishers are fleeing. Except, of course, for commissions, which for obvious reasons publishers do not have to pay. HashUp charges no commission for distribution and opens up completely new possibilities, to the benefit of the trading participants.

1.2.5 . The problem of software censorship

The delisting of games from distribution on centralised platforms has increased in recent times. An example of this is the delisting of a number of titles from the Steam platform due to the use of cryptocurrencies in their internal mechanics.[4] The solution we propose - through decentralisation - does not provide for this type of censorship while at the same time making it possible to control the content made available and its compliance with the rules - by means of a community vote.

1.2.6 The problem of infrastructure costs

The elimination of the intermediary from the system will transfer to the creators the responsibility and therefore the costs of maintaining the full infrastructure of files and servers. At this moment, most game servers are maintained by the creators anyway. The responsibility for the game files, on the other hand, lies mostly with the intermediary. Is that worth 30%? HashUp offers every Torrent[5] creator a decentralised free file base. All you need to do is upload the software on torrents connected to the HashUp plug-in so that the software is licensed. In the long term, we will be able to shift all the costs associated with maintaining on-line game servers to a decentralised network, thus reducing these costs to almost zero. At present, such solutions do not exist but we are going to invest in them and develop them ourselves.

1.3 New possibilities for decentralised distribution

The solution to the problems caused by the lack of a digital medium and centralisation is the decentralised digital licence medium proposed by HashUp, which enables a fair distribution model where the creator is free to create trading rules.

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[3] In the case of the Steam platform, it is 30%.
https//wwwpcgamer.com/moskgame-deVS-dont±i.hink-steam-earns-its-30-revenue-cut/

[4] https://www.coindesk.com/business/2021/10/27/29-blockchain-gaming-companies-pen-open-letter-to-valve-dont-ban-web3-games/

[5] BitTorrent (BTT) White Paper, Vo.8.7 Feb. 2019,
https://www.bittorrent.com/btt/btt-docs/BitTorrent (BTT) White Paper Vo.8.7 Feb 201q.pdf

1.3.1 Increase of earning potential for creators

Thanks to the decentralisation of distribution and the principles of free market and decentralised finance, creators have much more opportunities to earn money than in the previous distribution model.

The sources of income for game creators today:

- 70%-80% of profits per game license sold

The sources of income for game creators using the HashUp ecosystem:

- 100% profit on game licences sold, sales without intermediaries.
- Earning on every exchange between players (optional).
- Earnings from **providing liquidity** for the secondary market exchange of their own game.
- Profiting from speculation on games (speculators will be able to buy, for example, several hundred games at a time).

1.3.2 Proprietary nature of trade

The main problem that a decentralised software licence medium solves is the problem of not having a digital medium and therefore not being able to exchange software. Purchasing and owning a medium allows you to send someone a licence to your software. The decentralised digital medium makes it possible to think of owning games as in the 1990s.

1.3.3 The producer as a dictator of supply and the consequences thereof

There are currently no digital licence media in the centralised distribution model. Games are assigned to user accounts on one of the centralised platforms. In such a market, the creator is the **dictator of the minimum price.** HashUp turns this model upside down. At the time of publishing, the creator owns 100% of the supply of his/her digital cartridges. This means that the volume of supply of its product on the market depends on the creator. They can sell just 100 games but they can also try to sell 100 million.

Economic theory states that in a free market, the price is determined by the intersection of the demand and supply curves. A creator in the free software market has unlimited influence on the shape of the supply curve (save that some of their products may be lost, for example, due to loss of private keys). This means that the creator becomes the dictator of supply, i.e. they have full control over the number of copies released to the market. Please note that the creator/publisher is a business and is therefore interested in maximising profit. The creator will not artificially limit the supply just to make their games expensive. The supply to be made available on the market should therefore correspond to anticipated demand.

1.3.4 IGO — Initial Game Offering

The HashUp tool allows you to issue cartridges before assigning game files to them. This means that the creator can use HashUp as a completely new way to fund their projects, simply by selling cartridges for a game that is not yet developed. This process is called the Initial Game Offering and the name refers to the Initial Public Offering. During IGO, the game is sold at a fixed price set by the manufacturer to identify liquidity.

1.3.5 Speculation on the value of games and software

A consequence of the "proprietary nature of trading" in the game is the possibility of exchanging the game according to principles close to the free market. This means that the price of games on our cartridges should be determined by supply and demand, allowing speculation on game prices.

1.3.6 Independence and power for creators

The free market for games will "liberate" creators from publishers in the long term, making them much more independent. Raising money to build a game will become much easier and more efficient with HashUp because the people who participate in the fundraising will finally become "investors" and not just capital providers. It is the creators themselves who set all the rules for the secondary trading of each game cartridge they release. It is the creator who is the dictator of supply. It is the creator who has freedom, power and independence. This should unleash a huge level of creativity in the creators which has been blocked by those providing the capital for the game.

1.3.7 Decentralised rental facilities

HashUp enables the emergence of decentralised game rental facilities that allow games to be rented without intermediaries. Persons renting games are protected by a smart contract which guarantees the return of the game after a set period of time and does not require any intermediary. Automated rental by means of smart contracts will make it possible to earn passive income from owning a large number of games. In the future, the community itself will build such decentralised rental facilities.

1.3.8 Collecting

The possibility to own games like in the 1990s means that people will be able to collect any number of copies of each title and boast a high virtual shelf value on Gamexplorer.io. The number of cartridges you own may become a manifestation of your love for a particular game and a sign of your desire to reward the creators for their efforts. Similar motives can be observed in the market for NFT tokens or various cryptocurrencies, which are often accumulated for collecting purposes, albeit with a view to a future increase in the price of the acquired assets.

1.3.9 Player ID

Every player's account, i.e. their public address, will become a "Player ID" over time. In addition, the HashUp smart contract ecosystem allows you to assign a public address to a nickname so that every game will immediately "know" the name of that player and everyone can freely use those nicknames. All games, items and achievements of a player in the future will be linked to his/her public address, i.e. his/her account. If in the future there is competition for HashUp, the games will continue to be assigned to the same public address even though the player is using cartridges created by an entity other than HashUp.

2. # as a software exchange unit

2.1 What is #?

(that is "hash") is the unit of exchange for games and software. It is used to purchase cartridges on the blockchain and ads on HashUp. It provides liquidity in the free-to-play games and software market of the HashUp ecosystem. There are exactly 2.137 billion of all #'s. The company that set up HashUp has 250 million #'s in reserves. There are about 400 million #'s in initial circulation. 500 million #'s are allocated for rewards for liquidity providers of #'s. 1 billion #'s are allocated to ensure liquidity providers of cartridges. The period for unlocking all #'s in circulation is expected to be around 21 years.

2.2 What is the # for?

is necessary to:

1. Provide implicit liquidity to all cartridges needed for secondary trading.
2. Determine voting power when adding games to the official list - it is the players who decide whether a game will be released on the platform.
3. Purchase ads visible in the HashUp ecosystem.

2.3 How to earn #'s?

#'s can be earned in the following ways:

1. By publishing games.
2. By speculating on game prices.
3. By ensuring the liquidity of the cartridges.
4. By staking cartridges (distribution of new # units).
5. By staking #'s (distribution of new # units).
6. By providing liquidity for #'s and cartridges (distribution of new # units).
7. By speculating on ad prices on the HashUp platform.
8. By frequent air drops (e.g. using the Tubbly platform).

2.4 Tokenomy

2.4.1 Introduction

If we want to create a free software market, we need to pay particular attention to the basic attributes of that market.

It is the participants that are the most important attribute of the software distribution market:

1. Game creators;
2. Players;
3. # token holders.

We want to build value for each of those groups because they are closely interconnected and a lack of value in a project for any one of them will have a negative impact on the others. The basic assumption is the network effect - if a large scale is reached, each successive participant joining the market will find an already existing value, increasing it themselves.

The possibility to trade is an integral part of the value that we provide to market participants. This possibility, as another attribute, is directly expressed by liquidity. Without liquidity, there is no free

market, and its size is correlated with optimal pricing and influences stabilit price changes[6]

2.4.2 Liquidity mining.

Many projects use so-called staking, allowing users to block tokens in exchange for a share in the distribution of new ones. Due to the object of our project which is to create a free market for games, we have decided that this approach is insufficient.

A key aspect of HashUp's operation is the provision of liquidity. For that reason we want to reward them generously by giving users the opportunity to block their tokens to create a market[7] and allow their holders to earn both commissions and participate in the distribution of new # tokens. There is a mutual exchange of values. The user who believes in the project over the long term has the chance to increase his/her commitment, in return stabilising prices and allowing games to be priced optimally. This process is called **liquidity mining** and is used to provide liquidity for both the # itself and for games

2.4.3 Participation in key decisions and supervisory function - DAO

We want the owner of the # token to become a full and active participant in the project and the whole ecosystem that we are creating. The most important aspect of participation is the opportunity to vote and take part in giving direction on key decisions.

An example of a key decision is the choice of the blockchain on which the project is based. We are facing multiple questions. Should we support just one, chosen one? Or perhaps many of them? How can we predict which blockchain will dominate in the coming years and which will be forgotten?

For simplicity we have decided to base the initial phase of the project on the BSC blockchain. In the next phase of the project it will be up to the # token owners to decide if this is the right direction. In this way, we can flexibly adapt to the changing environment, ensuring that users are actively involved in project development. **Each year the # owners vote on the next blockchain to be used.** The voting period lasts 3 months and starts in the middle of the year.

Another aspect is the ability to choose the games available on our platform and to moderate any content. We also want to leave those functionalities to # token holders. In order for a game to be officially listed on GameCap and Gamexplorer, it must be approved by the community that owns the #'s. The number of #'s required for the official listing will decrease over time starting from 200 million #' at the start of the platform - where the HashUp organisation actually has the deciding vote, but as the community grows, the voting limit will decrease and the community will decide what should be released and what should not. The purpose of this is to minimise the risk of fraud and games published by fake creators.

[6] wikipedia - price discovery
[7] wikipedia - market maker

2.4.4 Share in profits - burning

Token owners, as active participants in the entire ecosystem, will also benefit through the mechanism of so-called token burning[8], which in the world of cryptocurrencies is equivalent to share buybacks.

An example of an activity from which we want to make a profit is running ads on GameCap.io. Advertising space can be auctioned off in exchange for # tokens which can then be burned.

2.4.5 Token distribution

The game market and the # token market affect each other. In order to be profitable to trade games, the token must have and maintain a value. At the same time, the value of the token is dependent on the success of the platform.

We have decided to allocate:
- a pool of 500 million #'s for distribution to users supporting the # token liquidity for a period of 20 years at monthly intervals;
- a pool of 1 billion #'s for distribution to users supporting the first ten thousand titled at monthly intervals.

The distribution period (number of intervals) will be determined individually by the creator of the game in the corresponding smart contract.

Anticipating an increase in the value of the token in the long term, we want to primarily reward users and creators who have joined us early, the so-called early adopters. Consequently, we have designed our distribution system so that the distribution in the first month will be significantly higher than in later periods. A similar rule applies to the distribution of first titles.

In each of the monthly intervals the user may at any time join the liquidity pool, locking his/her tokens until the end of a given interval in exchange for participating in the distribution of a given pool.

The reward will be distributed in direct proportion to the number of tokens in the pool and in direct proportion to the number of days the tokens have been in the pool.

Example:
- Let us assume that in a given interval 4 million #' will be distributed;
- User A joined the pool on day one with 100 thousand #;
- User B joined the pool on day 15 with 200 thousand #;
- User A will earn 266666.67 #'s per day on days 1-14;
- And 88888.88 #'s per day on days 15-30;
- User B will earn 177777.77 #'s per day on days 15-30;
- The reward will be accumulated for each day and distributed on the last day of the pool.

2.4.6 Technical aspects of distribution when supporting token liquidity

Assumptions:
1. 500 million #'s will be distributed at monthly intervals over a period of 20 years, giving 240

[8] coinmarketcap wiki - burning

months overall;
2. early adopters get a bonus for supporting the project in its initial phase

For simplicity's sake, let us first focus on Assumption 1. Let us assume a uniform distribution - the same number of tokens are distributed in each interval.

$$\frac{500000000}{240} = 2083333.3333333333$$

In this case 2083333.3333333333 will be distributed in both interval 1 and interval 240.

It should be noted here that to avoid problems with rounding, only integers will be used for distribution, and any difference will be burned, i.e. distributed to all owners. In this case it will therefore be 2083333.

However, let us add Assumption 2.

We propose that interval 1 tokens should account for tokens from interval 1 from the homogeneous distribution and 99% of tokens from interval 240.
In this case, interval No. 240 will have 1% of the tokens that would fall under a uniform distribution.
In the centre, i.e. for interval No. 121, there will be practically the same quantity as for the uniform distribution.

For instance, interval No. 1:

$$\frac{500000000}{240} + 0.99 * \frac{500000000}{240} = 4145833.333333333$$

And interval No. 240:

$$0.01 * \frac{500000000}{240} = 20833.333333333332$$

This can be generalised with the following formula:

$$(1+0.99*\frac{(\frac{total\_intervals}{2} - interval\_index + 1)}{\frac{total\_intervals}{2}})*\frac{total\_tokens\_to\_be\_distributed}{total\_intervals}$$

In practice:

$$(1 + 0.99 * \frac{(120 - interval\_index + 1)}{120}) * \frac{500000000}{240}$$

Where for interval No. 240 an excess of over 1% will be burned.

Uniform distribution over time:

The distribution of early adopters over time:

2.4.7 Technical aspects of distribution when supporting game liquidity

Assumptions:

- 1 billion #'s will be distributed at monthly intervals for 10,000 games;
- early adopters get a bonus for supporting the project in its initial phase.

In this case we also apply the thinking process from the case of token liquidity support but we will extend it to both the dimension of the number of games and the number of intervals.

Assuming uniform distribution, each of the first 10,000 games will be allocated a price:

$$\frac{1000000000}{100000} = 100000$$

Let us also assume that the creator of game 1 decides on a distribution period of 1 year, i.e. 12 months.

Each month will be distributed:

$$100000/12 = 8333.333333333334$$

However, to reward early adopters we will allocate all the tokens in game 1 from the uniform distribution and 99% of the tokens in game 10000 from the uniform distribution.

$$\frac{1000000000}{100000} + 0.99 * \frac{1000000000}{100000} = 199000.0$$

In game No. 1 in interval No. 1 we get:

$$\frac{(\frac{1000000000}{100000} + 0.99 * \frac{1000000000}{100000})}{12} + 0.99 * \frac{(\frac{1000000000}{100000} + 0.99 * \frac{1000000000}{100000})}{12} = 33000.83333333333$$

And in game No. 1 in interval No. 12 we get:

$$0.01 * \frac{(\frac{1000000000}{100000} + 0.99 * \frac{1000000000}{100000})}{12} = 165.83333333333331$$

2.5 Ads in the HashUp ecosystem - the secondary market of banner ad days

Each year we will release a series of 365/366 NFTs with the ability to edit the advertising content of each banner on the platform. Each NFT ID will indicate the day's banner ad status. The originally obtained #' will automatically be burned, increasing the value of the #' in circulation.

3. Cartridge in blockchain

3.1 What was a cartridge in the 1990s?

In the 1990s, the cartridge was used as a medium for software licences and data containing software such as games. The physical cartridge consisted of a plastic box with a label on it indicating the software contained in it. Players could freely exchange cartridges and therefore games. To run the game it was necessary to have at least one cartridge that could be destroyed.

Unfortunately, cartridges and physical distribution are slowly disappearing with the emergence of centralised digital distribution, and consumers increasingly do not own the software they bought.

3.2 What is a cartridge on the Blockchain? Cartridge 3.0

A decentralised digital licence medium is a smart contract[9] [10] to which a licence to use a given software is assigned and which informs about the number of licences assigned to the address. If the licence permits use of the game, the digital licence medium is called a Cartridge because in fact such a medium contains exactly the same information as the physical equivalent. The cartridge contains all necessary data, i.e. software title, description, information about the creators and the product. The smart contract alone cannot accommodate files, as this would be very expensive and inefficient. For this reason, the cartridge contains redirections to necessary data on other networks. Files on cartridges are held as links to files held on other decentralised networks created for those types of data. For game files, we suggest you use Torrent networks, a decentralised database of files. Obviously, the creators themselves must decide which tools they use to store data on the cartridge. However, for reasons of sustainability, efficiency and low cost, we suggest using decentralised solutions.

The Cartridge 3.0 is therefore a fully-fledged medium which has everything that its physical counterpart has, while maintaining a decentralised and permanent digital licence medium. The cartridge uses the ERC20 interface, meaning it can be stored on most cryptocurrency wallets and can use smart contracts compatible with this standard. Our medium contains the code from IGO (the gaming world's equivalent of ICO) and has its own liquidity pool, so we can assume that the cartridge itself knows what its current price is. The cartridge is created using the GameContract.io platform by means of a smart contract which we call "GameContract." To play the game, you simply need to own 1 cartridge. DRM protection is fully compatible due to OAUTH2.011[5]. During the initial phase of the project, the cartridge will have a liquidity pool that charges 0.3% commission on turnover, of which 2/3 goes to the liquidity provider and 1/3 goes to HashUp. These rules may change in the subsequent phases of the project.

3.3 Types of cartridges

We anticipate the following types of cartridges:

- **Green** - a free market cartridge, without any turnover commissions. No possibility to create additional supply after the creation of the cartridge. The colour refers directly to the stock exchange rises.
- **Gold** - a collector's cartridge, referring to uniqueness. The issuer has no ability to create additional supply. Maximum number: 133.700 units.
- **Blue** - an editable cartridge, the possibility of freely changing the indications of the turnover commission or the creation of subsequent copies over time. Offered to creators at the very beginning of the platform as the safest option where the creator has full control over the distribution.
- **Grey** - a cartridge with a fixed commission for secondary trading. The creator at the moment of creating a cartridge sets the commission and the number of cartridges that cannot be changed. The grey colour is a reference to neutrality - we believe this will be the most common colour.
- **Red** - a cartridge permanently assigned to the account. No transfer between players. Releasing a game in this way is similar to releasing a game in the current digital distribution model,

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[9] Ethereum White Paper, A NEXT GENERATION SMART CONTRACT & DECENTRALIZED APPLICATION PLATFORM, By Vitalik Buterin: https://blockchainlab.com/pdf/Ethereum_white_paper-a_next_generation_smart_contract_and_decentralized_application_platform-vitalik-buterin.pdf

[10] Sam Williams, Will Jones: Archain: An Open, Irrevocable, Unforgeable and Uncensorable Archive for the Internet, 2017, https: //www.arweave.org/whitepaper.pdf

where games are permanently linked to the account.

3.4 IGO or Initial Game Offering

Initial Game Offering is the game's initial public offering - game launch. At game launch, the creator sets the fixed price, the number of cartridges to be sold at IGO and how much of the IGO profit goes into the liquidity pool.

3.5 Liquidity pool and free software market

Each cartridge contains a **separate** liquidity pool . Liquidity makes it possible to buy and sell games and thus influence the price of each cartridge without the active participation of the other party in the market. The liquidity pool contains the reserves of a given cartridge and the reserves of #'s. The mechanics of IGO and the liquidity pool are closely related. IGO is effectively a process that allows you to determine what liquidity each cartridge should have at the start.

An example of the mechanics:

1. The creator sets a fixed price of 100 #'s per cartridge and starts the Initial Game Offering.
2. The creator determines that 1,000 cartridges go into the liquidity pool.
3. The creator determines that 10% of the funds go into the liquidity pool.
4. At purchase of 1 cartridge, the liquidity pool is not yet active and the liquidity pool status is as follows: 10 #'s / 1000 cartridges = 0.01#/cartridge.
5. With the purchase of 100 cartridges, the pool looks like as follows: 1000 #'s / 1000 cartridges = 0.1# per cartridge. The price of 1 cartridge is then 1 #. The creator, on the other hand, continues to sell copies of the game at a fixed price and collects #'s for liquidity. The pool is not yet active.
6. With the purchase of 10,000 cartridges, the pool looks like as follows: 100000 #'s / 1000 cartridges = 100# per cartridge. The price of 1 cartridge corresponds to the fixed price proposed by the creator. Liquidity has thus been collected; the creator has the opportunity to open a free market.
7. A player buying 100 cartridges from the pool, puts the current price into the pool: 100 #'s * 100 cartridges = 10,000 #'s. The pool (excluding 0.3% commission) looks as follows: 110,000 #'s / 900 cartridges, so the price has increased to 110,000/ 900 ~= 122 #'s per cartridge.

The person who provides liquidity (and makes money on it) is the so-called liquidity provider.[11]

3.6 What does the process of releasing a game on HashUp look like?

HashUp brings the natural, free-market model of cryptocurrency creation to the game development market. Cryptocurrencies are created in the following way:

1. The initiator creates a project White Paper (description of the idea) and gathers the first supporters of the idea.
2. The initiator creates a Landing Page - a page presenting the product.
3. Based on the White Paper and Landing Page, the cryptocurrency gathers a community that believes in the project by advertising it on on-line forums.
4. Raising funds for cryptocurrency development is an ICO, or Initial Coin Offering, selling promises to implement a project.
5. After the ICO, the cryptocurrency is listed on a cryptocurrency exchange and goes to CoinMarketCap, among others - the largest database of cryptocurrency listings.

[11] More e.g. https://www.econstor.eu/bitstream/10419/222424/1/IFRO WP 2020 08.pdf

Game launches on HashUp look similar. The description of fundraising (IGO) for the project, thanks to our model, looks as follows:

1. The initiator develops a GamePaper, i.e. publishes a description of the game idea, informs about the rules of the secondary market, the number of cartridges in circulation and collects the first supporters of the idea.
2. The initiator creates a Landing Page - a page presenting the game.
3. Based on the GamePaper and Landing Page, the creators gather a community that believes in the project by advertising it on internet forums or on a specially created platform: GamePaper.io
4. Fundraising for game development is called Initial Game Offering and consists of selling cartridges for a game that the creator has pledged to create in the future with the funds raised.
5. After a successful IGO, the game goes to GameCap.io to the list of games in development. GameCap lists free market prices for games.
6. When the game is finished, it will be published on the official GameCap.io list together with all other released titles.

On the HashUp platform it is also possible to release a game that has already been created - without a public fundraising (IGO). Then the process is as follows:

1. The creator creates cartridges for the finished title via GameContract.io. After the cartridges have been created, the creator links the game to them and adds any necessary data, files or pictures from the game to the cartridge.
2. The creator informs the community about the official cartridge and urges the community to vote for the cartridge. After a successful vote, the game goes to GameCap.io.
3. The title has its own launch, or IGO, during which the creator determines what proportion of the launch proceeds the creator allocates to the liquidity pool of the cartridge.
4. The creator after filling up the # liquidity pool opens the possibility of swapping the game (i.e. exchanging #'s for cartridges or vice versa), thus opening the free market for cartridges. From this point onwards the price of the game is determined by the forces of supply and demand, and the creator earns money by providing liquidity, trading in each game and acting as an optional dictator of supply. The cartridge status of the respective cartridge holder can be checked on Gamexplorer.io.

3.7 How does the cartridge commission work?

The commission for trading in cartridges constitutes a fraction of the cartridge determined by the creator and "burns" it. This means that cartridges are deflationary. For example, if you send one cartridge and the trading commission is 10%, 0.9 of the cartridges will appear on the recipient's public address and he will have to buy 0.1 more of the cartridges. If, on the other hand, a player wants to buy a cartridge with the option of sending the cartridge twice, then at a 10% commission on sales he would have to buy about 1.25 cartridges.

To start the game you need to have at least 1 card of the title in question.

3.8 Achievements

Achievements are a specific type of "assets" which cannot be exchanged and which are permanently assigned to the account. Getting an achievement is like getting a red cartridge which cannot be transferred between addresses and which will "mint" to the address of the player who got the achievement. Achievements resemble the combination of the ERC20 and ERC721 (NFT) operating mechanisms, where the uniqueness index from NFT is related to the number of people who have reached the achievement

(reached its index, "minted" to have it).

4. HashUp ecosystem

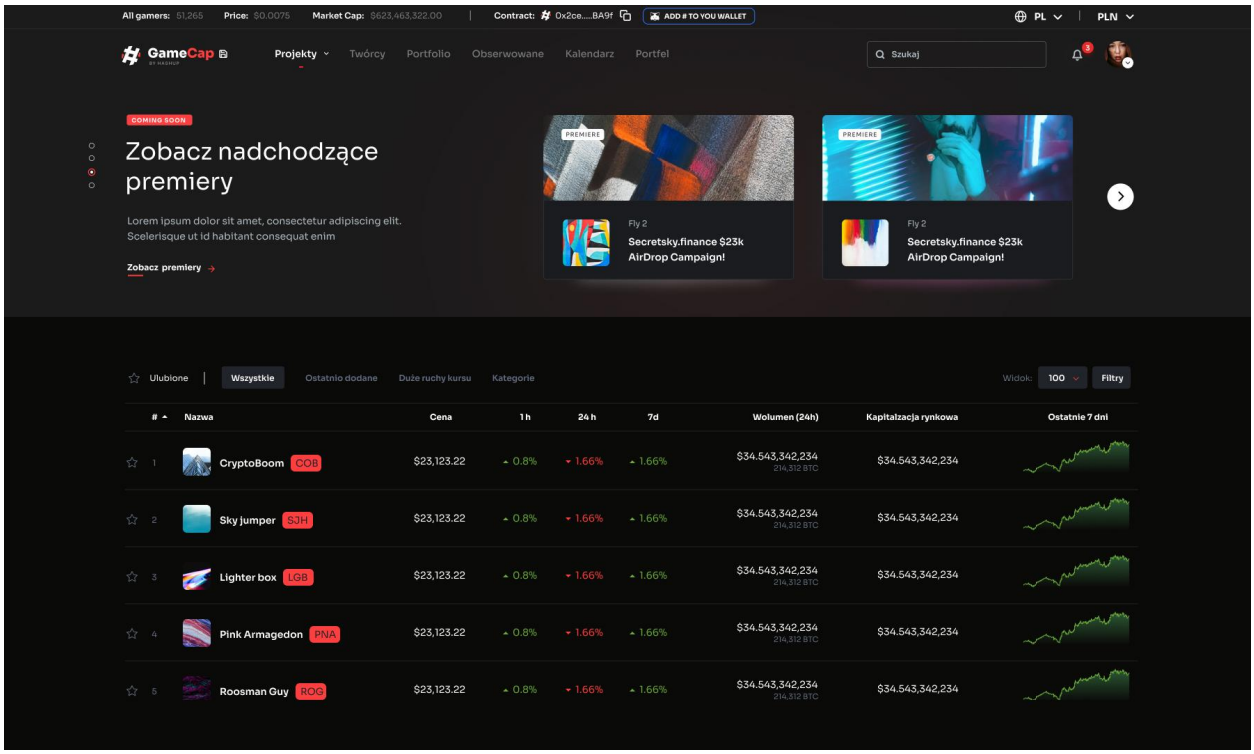
The HashUp ecosystem consists of several platforms that co-exist. It combines efficient and well-known models of functioning in the cryptocurrency market into one big platform for decentralised software distribution and trading.

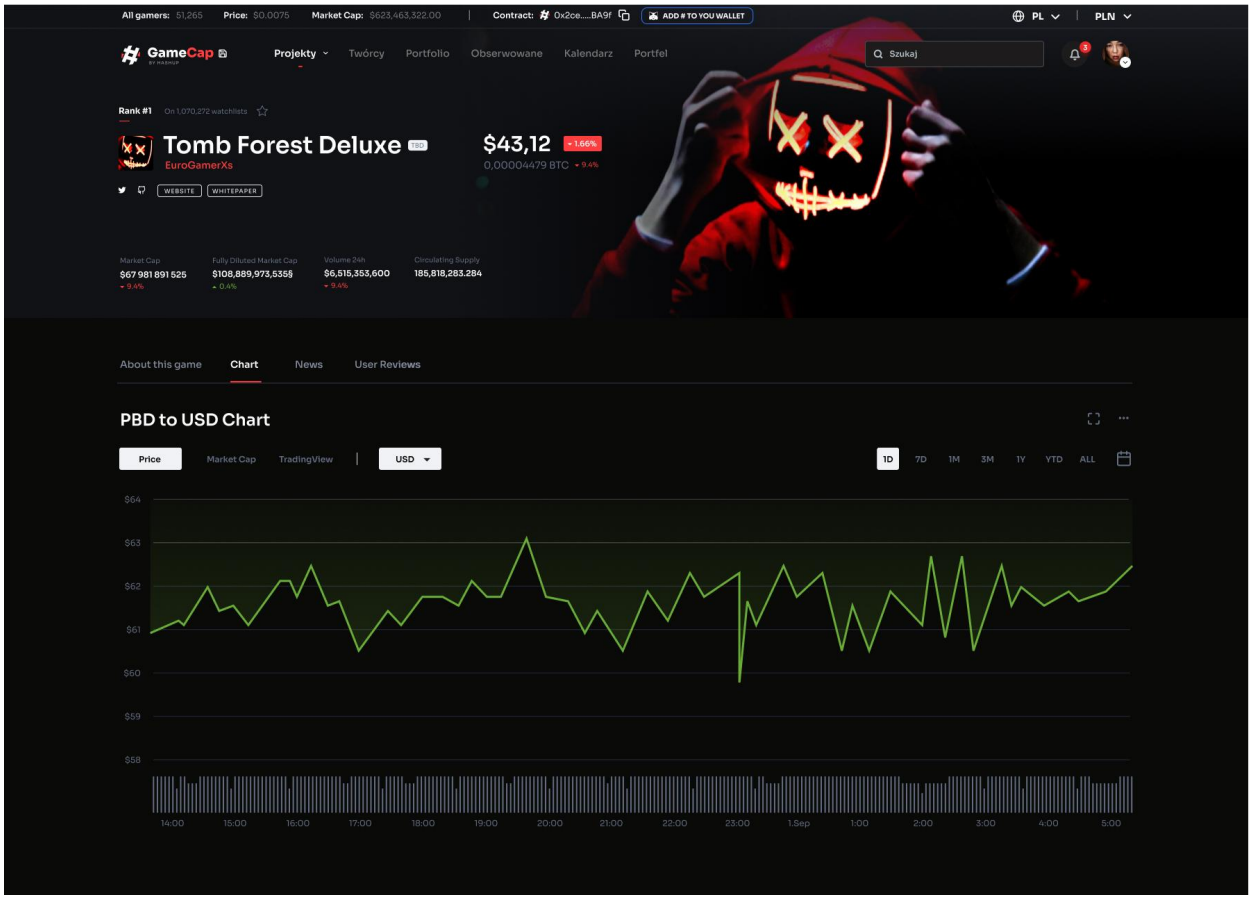
4.1 GameCap.io

The consequence of giving players full rights over the digital medium is the free market price. There is therefore a need to create a tool that will index all cartridges and their price changes over time. In order to bring the cryptocurrency model as close as possible to reality, we decided to take inspiration from **CoinMarketCap**, a platform listing (almost) all cryptocurrencies and most digital tokens.

GameCap.io is a platform that collects information on all cartridges, making it easy to buy them from the producer at a fixed price or from the liquidity pool contained in the code of each cartridge. The advertising space on GameCap works similarly to NFT, where the index represents each successive day that can be sold and bought. This means that the price of advertisements on GameCap.io will be determined by the free market. Smart Contract responsible for the administration of advertising and advertising days only accepts #'s as a form of payment. In the future the listing will have at least 4 tables.

1. Listing of launched games and their capitalisation and volume in the last 24 hours, NON-NFT games.
2. Listing of cartridges that are in production and that have raised funds through HashUp, NON-NFT games.
3. Listing of coins used in NFT games and their capitalisation.
4. Listing of coins that are in production and that have raised funds through HashUp.

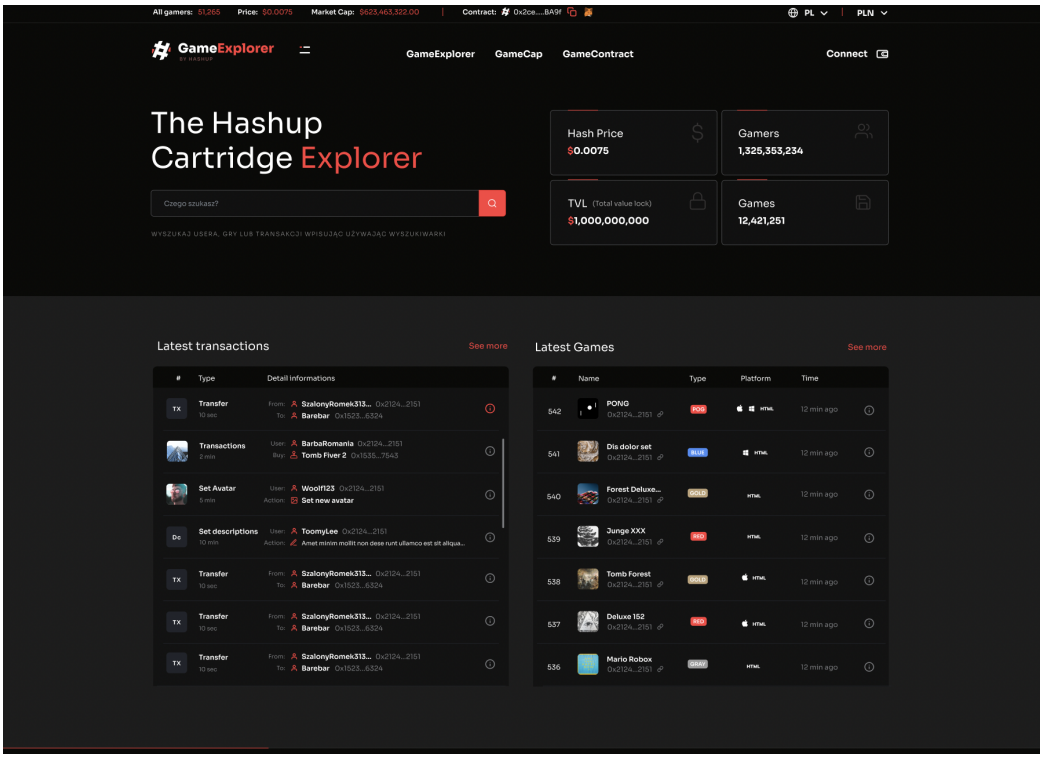




4.2 Gamexplorer.io

Gamexplorer is a replication of **Etherscan**, a public and transparent blockchain explorer, in the gaming world. Gamexplorer focuses on presenting the player's library of titles and achievements as well as their blockchain account balance. It allows viewing the transactions that have taken place recently on each cartridge and in each wallet. In the future it will be compatible with the most popular NFTs, such as crypto punks. Conceptually, we are looking at the possibility of creating a "picture", something of value based on the coefficients of the number of games owned. Gamexplorer will highlight possession of more than one cartridge of a particular title.

1. Possession of 1 cartridge will not distinguish the game cover.
2. Possession of more than 3 cartridges will add a brown border to the game cover.
3. Possession of more than 8 cartridges will add a blue border to the game cover.
4. Possession of more than 21 cartridges will add a red border to the game cover.
5. Possession of more than 55 cartridges will add a gold border to the game cover.
6. Possession of more than 100 cartridges will add a gold border together with a gold cover of the game.


All gamers: 51,265
Price: $0.0075
Market Cap: $623,463,322.00
Contract: 0x2ce.....BA9f
PL
PLN
GameExplorer
GameExplorer
GameCap
GameContract
Connect
The Hashup Cartridge Explorer
Czego szukasz?
WYSZUKAJ USERA, GRY LUB TRANSAKCJI WPISUJĄC UŻYWAJĄC WYSZUKIWARKI
Hash Price
$0.0075
Gamers
1,325,353,234
TVL (Total value lock)
$1,000,000,000
Games
12,421,251
Latest transactions
See more
Latest Games
See more
Type
Detail informations
Transfer
Transactions
Set Avatar
Set descriptions
Name
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PONG
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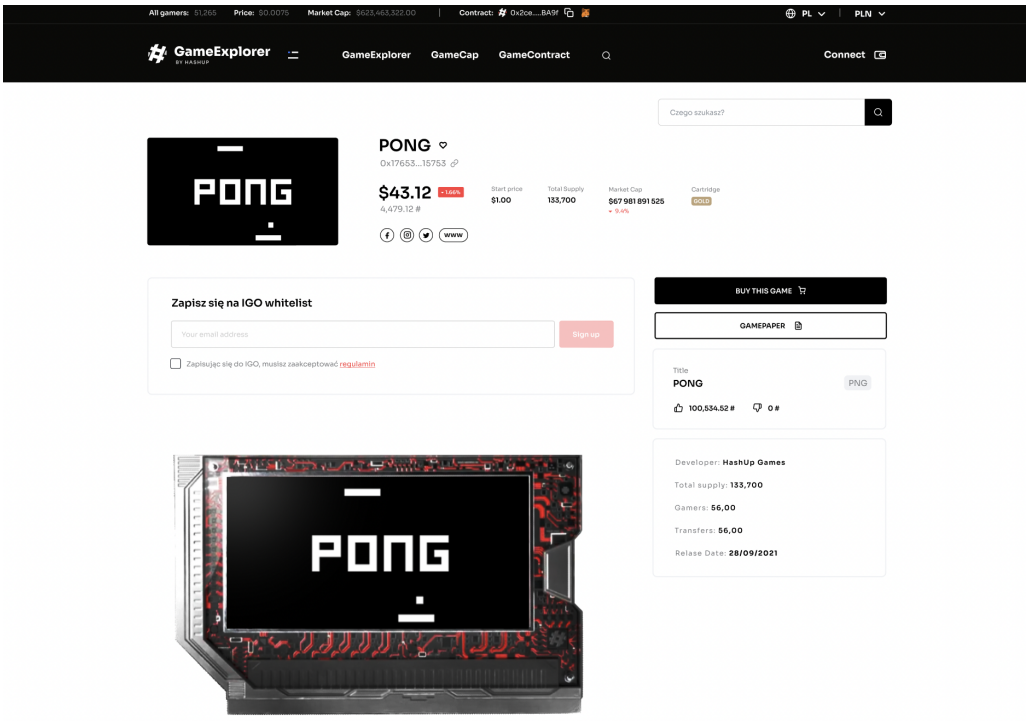
Junge XXX
Tomb Forest
Deluxe 152
Mario Robox


All gamers: 51,265
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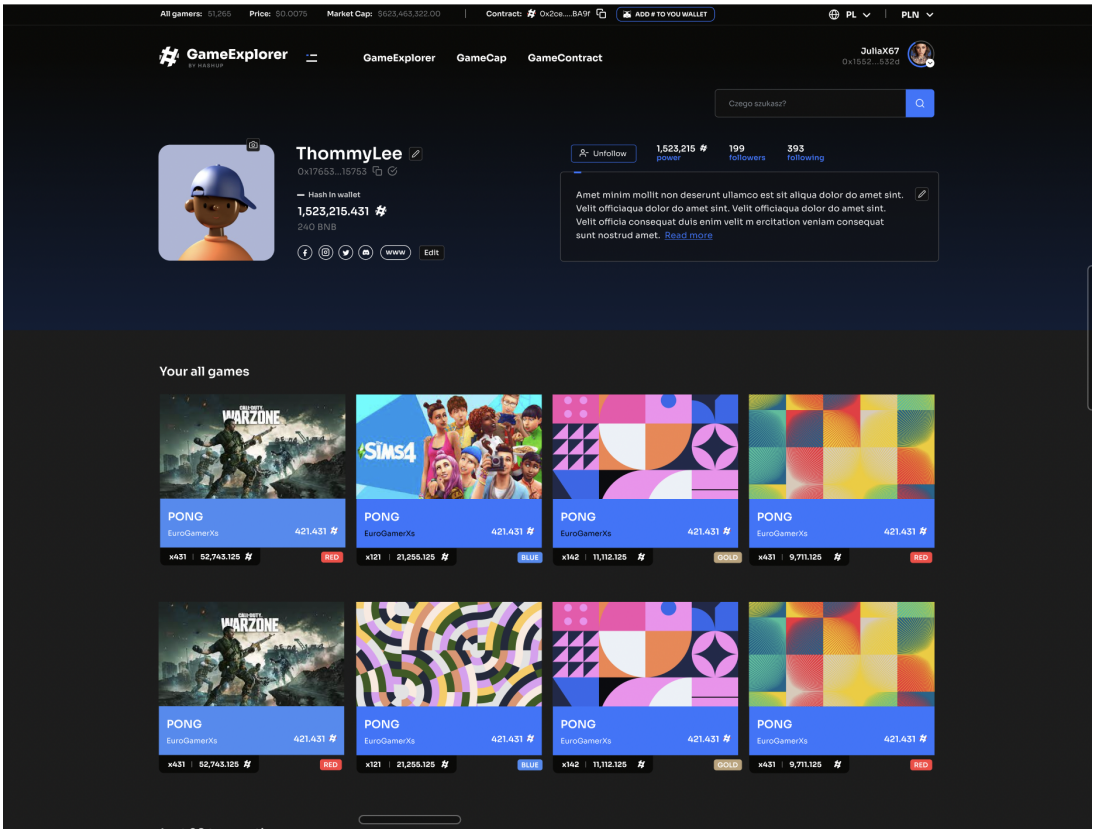
PL
PLN
GameExplorer
GameExplorer
GameCap
GameContract
Connect
Czego szukasz?
PONG
0x17653...15753
$43.12
4,479.12 #
Start price
$1.00
Total Supply
133,700
Market Cap
$67 981 891 525
Cartridge
SOLD
www
Zapisz się na IGO whitelist
Your email address
Sign up
Zapisując się do IGO, musisz zaakceptować regulamin
BUY THIS GAME
GAMEPAPER
Title
PONG
PNG
100,534.52 #
0 #
Developer: HashUp Games
Total supply: 133,700
Gamers: 56,00
Transfers: 56,00
Relase Date: 28/09/2021


All gamers: 51,265
Price: $0.0075
Market Cap: $623,463,322.00
Contract: 0x2ca....BA9f
ADD # TO YOU WALLET
PL
PLN
GameExplorer
BY HASHUP
GameExplorer
GameCap
GameContract
JuliaX67
0x1552...532d
Czego szukasz?
ThommyLee
0x17653...15753
— Hash In wallet
1,523,215.431
240 BNB
www
Edit
Unfollow
1,523,215
power
199
followers
393
following
Amet minim mollit non deserunt ullamco est sit aliqua dolor do amet sint. Velit officiaqua dolor do amet sint. Velit officiaqua dolor do amet sint. Velit officia consequat duis enim velit m ercitation veniam consequat sunt nostrud amet. Read more
Your all games
PONG
EuroGamerXs
421.431
x431 | 52,743.125
RED
x121 | 21,255.125
BLUE
x142 | 11,112.125
GOLD
x431 | 9,711.125

4.3 GamePaper.io

GamePaper will be a future platform for financing the production of new titles. The aim of the platform is to create fundraising for games as efficiently as possible, where, with the aid of GamePaper, describing the production and the rules of its secondary trading, everyone will be able to invest funds and buy game cartridges before the game is released.

4.4 Gamexchange.finance

Gamexchange aims to be the first decentralised gaming exchange that combines AMM (Automatic Market-Maker) principles within an Order Book to give players and creators as much speculation as possible. The order book is indispensable from the point of view of the supply dictator that is the creator.

4.5 HashWallet/GameWallet: PC, Linux, Mac

HashWallet is a wallet for the most popular cryptocurrencies and cartridges based on the HashUp ecosystem. It has an internal explorer - Gamexplorer which makes it possible to buy and sell games directly on it. HashWallet is required to release games outside of the browser with DRM protection associated with the cartridge.

4.6 Architecture

The HashUp architecture consists of four main components:

- the client,
- centralised smart contracts,
- a centralised smart contract analysis server
- a blockchain on which data is stored.

The HashUp architecture is a typical architecture used in the design of dApps, i.e. decentralised WEB 3.0 applications with the addition of server support that analyses publicly available data contained in smart contracts to significantly optimise the computation involved in client-side data processing.

4.7.1 Client's site

The client using **Metamask** operates directly on a Smart Contract, listening to the events broadcast by it. Address data such as social media, nickname, icon URL address are directly on the blockchain and require a signature for each edit. This means that it is not possible to change the data. Our platforms resemble elaborate explorers of the smart contracts we have created. The client also receives data from a server which analyses all events emitted by users on our smart contracts in real time.

4.7.2 HashUp Smart Contracts

The Smart Contract HashUp contains public address information posted by account holders. Each cartridge is a separate smart contract with game data that can only be edited by the creator of the cartridge. Smart Contracts emit events which are listened to by the client and the analysis server. Smart Contracts often communicate with each other. There is also a blocked supply of #'s in them, which is released over time with each new official game on the platform.

4.7.3 HashUp analysis server

The Smart Contract HashUp contains public address information posted by account holders. Each cartridge is a separate smart contract with game data that can only be edited by the creator of the cartridge. Smart Contracts emit events which are listened to by the client and the analysis server. Smart Contracts often communicate with each other.

4.7.4 Blockchain layer

Blockchain is a decentralised^ database^ of players' licence holdings (their public addresses), achievements. Data about the stored licences will use different blockchains.

An example of the use of blockchains on which we intend to open in the future:

- Binance Smart Chain - a young platform, browser games, PC games
- Ethereum - a mature platform, AAA games after a significant reduction in commissions
- Ethereum Classic - a mature platform, classic games
- Polygon (MATIC) - a young platform, PC games, AAA games
- Solana - a mature platform, AAA games, PC games

Avalanche - a mature platform, PC games, AAA games

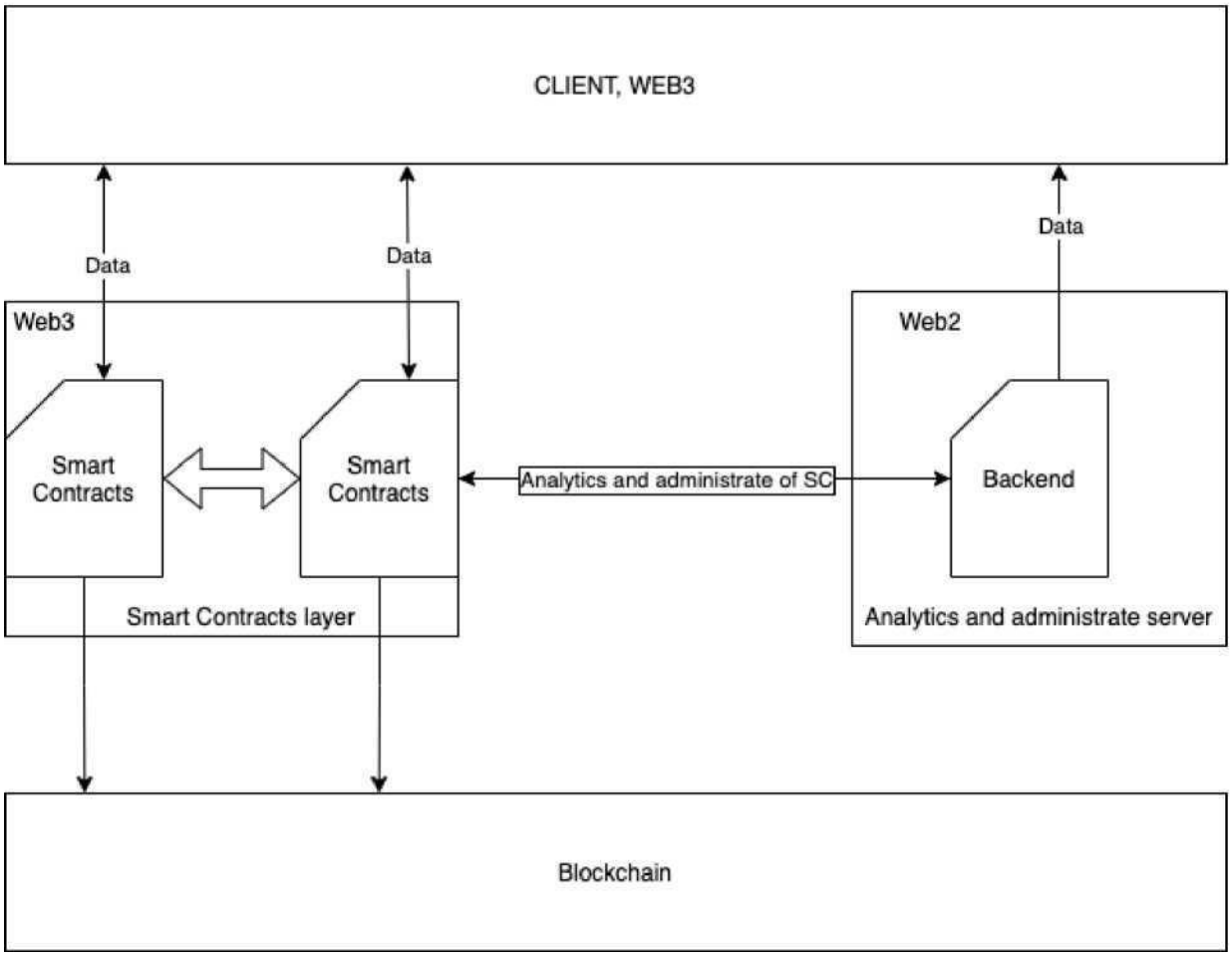
4.7.5 BitTorrent layer

BitTorrent is a p2p file protocol. Creators who do not wish to maintain their own file infrastructure can share game files for free via the BitTorrent protocol. In the future we plan to have our own BitTorrent client where you will only be able to download files provided by the creators themselves.

4.7.6 Arwave layer

Arweave is a protocol that allows data to be stored **permanently**. We want to use the Arwave blockchain to store images on cartridges. Those images will never disappear, making the **cartridge on the blockchain eternal.**

HashUp Architecture model



5. Roadmap

The roadmap will take the form of the goals we want to achieve or the problems we want to solve in the given time period specified in the sub-chapter.

5.1 Q1 - Q3 2021 - Team building and conception phase

- Idea development
- Whitepaper
- Recruiting people who believe in the idea by means of internet forums
- Issue of # token
- **Commencement of work on HashUp**
- HashUp private sale
- Adding the possibility of publishing HTML games

5.2 Q4 2021 - Staking phase

- **HashUp Fundraising**
- **Adding liquidity to Pancake Swap**

- **Launch of the first game licensed on blockchain - PONG**
- First partnerships related to GameDev
- Launch of **Gamexplorer.io**
- Launch of **GameCap.io**
- Development of cartridges version 1.0 - **cartridge with staking**
- **Adding the possibility of publishing PC games, without DRM**
- **Possibility of staking cartridges and #'s**
- Adding liquidity to the first game - PONG
- **DEX listing**

5.3 Q1 - Q2 2022 - Staking phase

- **Launch of the first 20 games on the platform**
- **Launch of the first PC game**
- Launch of GameContract.io
- Start of development of mobile versions of GameCap, Gamexplorer, GameWallet
- Continued work on Cartridges. Development to version 2.0 - **cartridges with liquidity mining**
- **Launch of GameWallet for PC**
- **Adding the possibility of publishing PC games, with DRM**
- Unity, Unreal Engine plug-ins, general integration with the most popular game development engines
- C, C++, GO, Python, C# plug-ins

- **Commencement of work on Gamexchange**
- Integration of cartridges into the metaverse world, virtual shelves with games and achievements
- Start of work on using the blockchain technology in gaming achievements
- HashUp appears at the first gaming events
- NFT for players and creators.
- Launch of the platform on **blockchain POLIGON (MATIC)**

5.4 Q3-Q4 2022 - Liquidity Mining phase

- **Start of Liquidity Mining of #'s and cartridges**
- Launch of HashUp in mobile version
- Launch of **GameContract.io**
- Launch of **Gamexchange**
- Start of works on GamePaper
- **Discussions on the first games exclusively available on HashUp**

5.5 2023+

This Whitepaper shows the main principles we want to follow when building HashUp. Nevertheless, we believe that this is only the beginning of the research and development of **decentralised distribution platforms.** We believe that in the future blockchains will not compete for who has the greatest computing power underneath but for who manages that computing power most efficiently.

Here are some examples of developments that we will focus on during HashUp's maturity phase.

- Research into the **economic issues surrounding the open distribution of software** so that creators can make the most of their potential.

- Research on **smart contracts**, which will complement the economy created by the creators even better.
- Research on **GameContract and SoftContract** in order to best meet the expectations of the creators.
- Research into technology, Blockchain and P2P, the potential of which we have not yet fully discovered.
- Research **on how to authorise** software units on the Blockchain with software to best merge file rights with files.
- **Integration** of a decentralised software distribution platform **with mobile devices and consoles** and with devices yet to be developed.
- Integration with alternative networks such as **Helium** [6], so you can play anywhere without needing an internet connection.
- Working on cloud, computing, Google Stadia style, GeForce Now along the lines of a combination of **Helium and Golem** [7] for gamers, so everyone can play the latest games without having to buy expensive hardware.
- Research into enhancing the software experience in order to fully exploit the digital potential as a place where we may have to go to one day.
- Research into the implication of sensory experience directly by computer into consciousness, as an artificial screen in front of the eyes will never allow us to do what we dream of.

Computer games, their development and the development of computing are inextricably linked to the gradual increase in the stimuli we are able to deliver digitally to the mind. We are not trying to predict the future; we are only trying to understand the next phase of the cycle that will come about thanks to the development of games and computing. We want to free the software market so that it starts to be free which pays off for everyone in the long term. Therefore, we think that an economic model of distribution will prevail in the software market that will free up the market to take us even faster into the future.

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