



THE FIRST DECENTRALIZED CHESS PLATFORM RUNNING ON THE ZILLIQA BLOCKCHAIN

# WHITEPAPER

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## **1. ABSTRACT**

Chess is one of the most ancient and popular board games worldwide. The advent of traditional online gaming platforms has supported the growth of a global chess community. Nowadays there are several traditional online chess gaming platforms with millions of registered users/players forming a huge community of chess passionate people which continues to grow even for the attention that social media are dedicating to chess-related events.

A Distributed Ledger Technology (DLT) like the Zilliqa blockchain can constitute an ideal infrastructure where to play online chess. Zilliqa is attractive for several reasons, among them: its performances in terms of scalability (transaction speed), security of transactions, transparency of results, secure rewards distribution and, last but not least, low cost of transactions.

On the other side the Zilliqa blockchain can benefit from the attention that a large global chess community can dedicate to a dApp running online chess games.

ZilChess, the first fully decentralized chess gaming platform running on the Zilliqa blockchain, finds its origins in this context, and aims to attract as many chess players as possible.

## **2. INTRODUCTION**

Most of the traditional online chess games use a centralized third party to ensure that everything runs smoothly. Players register and play in these platforms simply because they trust the service provider and they think that the service provider is protected enough by external attacks.

The idea behind a decentralized chess platform like ZilChess is to remove the need of trusting someone and eliminate the risk connected to a central single point of failure. Moreover, ZilChess is a platform where players bet a fixed amount of ZILs and get a reward in case of victory. This feature makes even more important the reliability and security of a decentralized chess platform.

All moves (transactions) take place on the global, transparent ledger of the Zilliqa blockchain. Players move their pieces invoking transitions of a Scilla smart contract and receive back opponents' reply through messages (events) echoed by the decentralized peer-to-peer Zilliqa web socket server.

### **3. ZILCHESS CONTRACT**

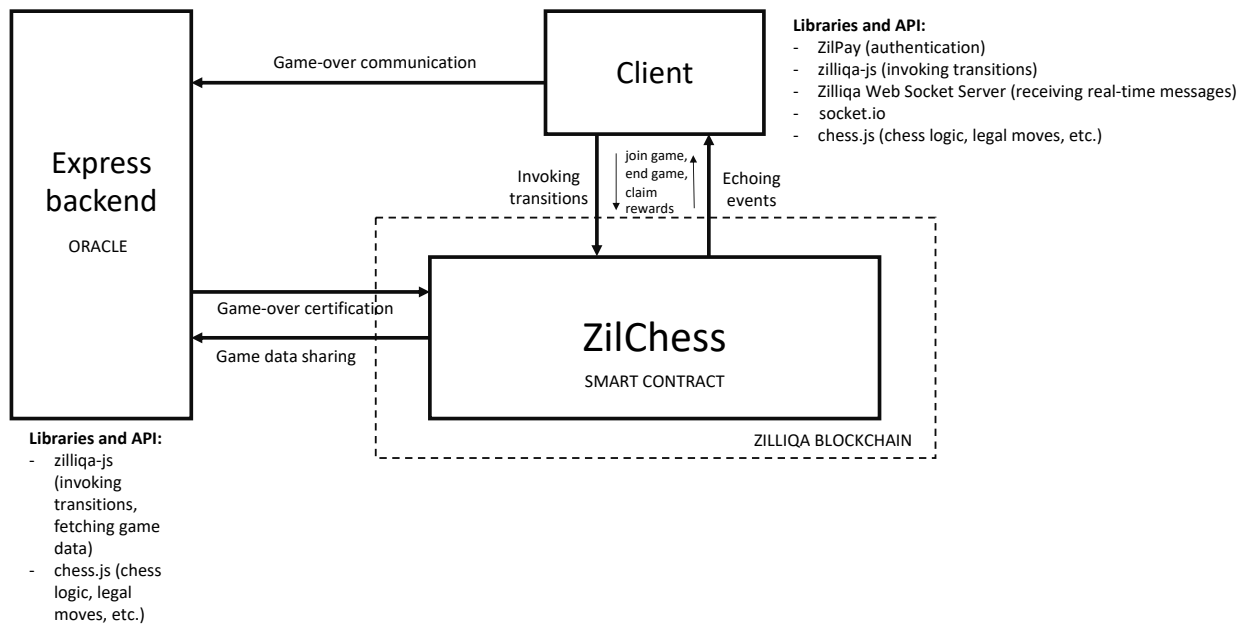
Zilliqa, like Ethereum, works with Smart Contracts, which are compiled programs running on the blockchain. If well-designed, these programs are reliable, transparent and cheat-proof.

The ZilChess contract has been designed to prevent any kind of external attack and/or cheating tentative perpetuated by players. This contract is made by several transitions and procedures that sometimes can be invoked by anyone, sometimes only by the single player for her own game and sometimes exclusively by the owner of the contract. The ZilChess smart contract is supposed to execute several tasks, such as:

- a. player registration,
- b. game initialization,
- c. results registration,
- d. ELO score registration,
- e. game certification
- f. reward distribution

It interacts with the frontend (client-side) of each player and with the ZilChess.com Express backend.

The overall macro-architecture of the ZilChess platform is reported below,



### ZilChess – Platform Architecture

For containing and reducing at the minimum the gas fee of a transaction (a critical KPI which makes the platform attractive or not), the development team has decided to remove some gas-consuming tasks from the smart contract. These tasks are therefore executed 'off-chain' by some client-side and server-side libraries (dApp oracles).

The above-mentioned off-chain tasks are the following:

- legal moves verification and transmission (client-side library / oracle)
- end-of-game validation (server-side library / oracle)
- ELO score calculation (server-side library / oracle)

The platform is completely decentralized, most of the txs are processed between the frontend and the blockchain. However, for avoiding security breaches, the server is demanded to 'certify' all the completed games and approve only the games played correctly with the GameOver tx called by the frontend. All the games not certified by the server are called "FAKE" and they are not eligible for any rewards but only for the refund of the bet amount deducted by the dividends and by the commissions.

#### 4. ZILCHESS RULES

FIDE chess rules apply for each game with only few exceptions. These exceptions are:

1. time control is paced by Tx Blocks,
2. a player must complete all her game within 12 Tx Blocks, if she fails in doing that, she loses the game whatever the position is,
3. players cannot resign,
4. players cannot offer draw to opponents,
5. when a pawn is promoted to the 8<sup>th</sup> rank, it is always promoted to a Queen (at the moment sub promotions are not foreseen),

in addition to the above-mentioned specific chess rules, there are some general game rules to be considered:

6. a player bets fixed amount of ZILs for joining a game (options available: 150 ZILs, 250 ZILs, 350 ZILs, 500 ZILs),
7. 5% of the total betted amount of ZILs in the chess game will be stored as Dividends to be distributed among the ZCH token hodlers, the remaining 5% will be credited to the development team,
8. when a player wins the game, she can claim a reward equal to the total betted amount deducted by the above-mentioned 10% (Example: winning a 150 ZILs game makes a player eligible to claim a reward equal to  $(150 + 150) \times 0.9 = 270$  ZILs). The reward is claimed clicking on the 'CLAIM' button located in the corresponding gameId row in the 'MyGames' page ,
9. if a player and her opponent draw the game (no winner), both of them can claim back their betted amount deducted by 10% (Example: drawing a 150 ZILs game makes a player eligible to claim a refund equal to  $150 \times 0.9 = 135$  ZILs). The refund is claimed clicking on the 'CLAIM' button located in the corresponding gameId row in the 'MyGames' page,

10. if a player joins a chessboard and no opponent joins the other side of that chessboard, whenever the player wants, she can claim back the total betted amount (with no deductions) clicking on the 'GET REFUND' button
11. games which end by time expiration with less than 2 moves (4 semi-moves) are declared 'NULL'. After a game is declared 'NULL' the total bet amount is credited back to the players accounts. Players who end a 'NULL' game won't receive any ZCH reward for that game.
12. games which don't receive the certification from the server are declared 'FAKE' and are not eligible of any rewards, they will get instead the refund of the bet amount deducted by 10%. The server will automatically send the refund to all the 'FAKE' games.
13. each player/account can play one single game at a time

## 5. TOKENOMICS

ZilChess rewards its active players by distributing **ZCHs**. ZCH is a ZRC-2 compliant fungible token which gives the holder the right to cash-in a share of the ZilChess accumulated monthly dividends. ZCHs have a maximum total supply of **500,000 tokens**. These 500,000 tokens will be allocated in the following way:

**100,000 tokens:**

to be allocated partially on the ZilSwap platform and the remaining portion to future promotions

**400,000 tokens:**

to be distributed to active players

the distribution of ZilChess tokens to active players will be executed in the following way

completing a chess game with 150 ZILs bet →

total reward: 4.5 ZCH

- i. player: 1.5 ZCH
- ii. liquidity providers' fund: 3 ZCH

completing a chess game with 250 ZILs bet →

total reward: 9 ZCH

- i. player: 3 ZCH
- ii. liquidity providers' fund: 6 ZCH

completing a chess game with 350 ZILs bet →

total reward: 12 ZCH

- i. player: 4 ZCH
- ii. liquidity providers' fund: 8 ZCH

completing a chess game with 500 ZILs bet →

total reward: 18 ZCH

- i. player: 6 ZCH
- ii. liquidity providers' fund: 12 ZCH

Each player can withdraw her/his ZCH tokens clicking on the 'MINT' button located in the corresponding gameId row in the 'MyGames' page.

The ZCH allocated in the liquidity provider's fund will be distributed twice a month in two undisclosed dates decided by the admin. These ZCH will be sent to the Liquidity Providers before the dividend distribution.

The share of the fund for each liquidity provider is determined by aggregating the daily contribution (to the ZCH ZilSwap pool) of each liquidity provider and dividing this amount by the



total aggregated daily contribution of that month. The contribution of the ZilChess development team will not be taken into account in the above-mentioned calculation.

After the distribution of the ZCH allocated in the liquidity providers' fund, it will be recorded a snapshot of the status of the circulating supply of ZCH.

The dividends will be calculated considering the shares of each account holding ZCH (excluding the development team account). The dividends matured by the ZilSwap liquidity providers' account will be distributed to the liquidity providers, at the moment of the snapshot, according to their contribution in that specific moment.

ZCH will be distributed until the total amount of distributed tokens reach a quantity of 400,000.

## **6. REFERENCES**

**Web:** <https://www.zilchess.com>

**ZCH contract address:** zil1s8xzysqcxva2x6aducncv9um3zxr36way3fx9g