



TOKEND



PM PARTNERS

Solution Brief

Method of blockchain integration into ERP systems

Solution Brief

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Executive Summary

Global tasks that blockchain approach is expected to solve is the introduction of authenticity and integrity of digital records, which, due to their vulnerable nature, are prone to manipulations, backdating, cancellation, etc.

Accounting issues and mistrust of accounting data

In the modern digitally evolving world, traditional approaches to accounting are no longer secure. This is mostly the result of the fact that digital data is highly vulnerable: proving that particular data has been added by a particular party in a particular moment of time is fairly complex and time consuming if not impossible. Such a critical weakness results in a number of hardships; some of them are as follows:

- Risk that performed transactions are not recorded in the accounting system, no matter whether it is concealed intentionally or missed accidentally;
- Threat that a transaction which is not performed is, nevertheless, being recorded in the accounting system (both intentionally and accidentally);
- Ability to backdate or cancel the action which had been previously recorded in the system;
- Inability of an external system (e.g., auditor) verify the accounting data explicitly and in real time.

Basic blockchain principles

- Decentralization: Data maintenance and processing are performed in different places (and if needed, by different parties), eliminating a single point of failure;
- Security backed by cryptography: Each data alteration in the system is signed via a cryptographic key, which makes it possible to trace, prove and verify;
- Authenticity and transparency: Not only data is available to all system participants with appropriate permissions, but they can also each verify that this data is authentic and complete;
- Immutability: Once all parties have agreed on the ledger state, transactions cannot be re-written or backdated unnoticed;
- Trustless audit: An external system is able to receive data in real time and verify its authenticity and integrity.

Expanding Accounting control with Blockchain

Existing blockchain solutions do not implement even a percent of the entire centralized ERP systems functionality. Hence the development of a full-fledged ERP system analogue based entirely on blockchain is a rather cost and time-consuming process, which doesn't pay off usually—it wouldn't be as effective in terms of functionality, scalability, stability, etc.

Instead, blockchain could be used as an additional system layer for trouble-proof timestamping, effectively solving the problem of digital data being vulnerable to unauthorized changes as well as of the impossibility of this fact being explicitly traced and proved. More specifically, blockchain could provide for the *authenticity and integrity of digital records*.

This approach is called *triple-entry accounting*, which increases the integrity and authenticity of digital records by supplementing traditional double-entry. This term was originated near forty years ago, but secure application proved to be possible only with the advent of blockchain. Whilst traditional bookkeeping presumes the record of transactions by two entities—debit and credit—triple-entry means that records are being immediately recorded in a third entry, which, in our case, is a distributed ledger that is accessible to anyone with corresponding access (e.g. company shareholders, auditors, regulatory authorities, etc.).

Each data record/transaction in an ERP system is being hashed, and the hash is being written on a blockchain. If a malicious party tries to outwit the system by claiming that he/she hasn't done particular action (which he/she has in reality done at a particular moment in time), this fact of unauthorized data alteration will be immediately noticed and **verifiably** proved since the hashes of previous actions in the system are all written on an immutable blockchain.

Best practice of implementing blockchain is to consider all internal procedures and mechanisms in an ERP system unconfirmed before they are being confirmed on the blockchain level.

Integration of the TOKEND solution

As it has been said, the essence of the TOKEND blockchain solution being integrated into an Enterprise Resource Planning (ERP) system lies in using blockchain as an additional security layer that ensures authenticity and integrity of digital records.

After each transaction initiation, an ERP system queries the needed details to the TOKEND node. The TOKEND Node distributes this transaction among the remaining nodes, and it is being added to the blockchain; the result is a change of the ledger state. Then, the TOKEND Node returns the transaction's hash value to an ERP system, which records it in its database.

Note: It is possible that not all transactions are being recorded on a blockchain. This depends entirely on the company's goals (e.g., account transactions, sales, purchases, etc.).

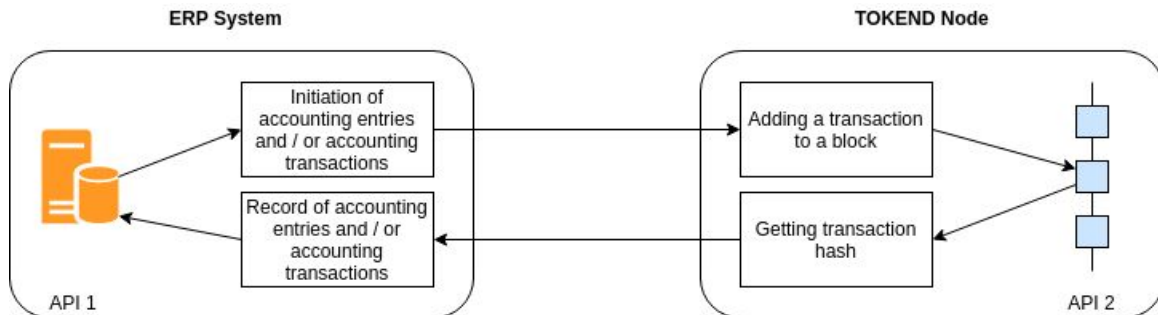


Figure 1. ERP system communicating with the TOKEND Node

Workflow

1. An accountant inserts a document into an ERP system.
2. ERP system sends a transaction containing the signed document's hash value. The TOKEND Node processes the transaction and adds it to the blockchain.
3. After a transaction has been added, the TOKEND Node returns its hash value to an ERP system. An ERP system makes an entry of the transaction's hash value into its database.
4. To check the integrity of the change history, the Security Department has its own TOKEND node with its copy of the transaction history (the Department refers to its own blockchain state).
5. The Security Department compares the current state of its own ("local") blockchain with the state of an ERP system's database. If the two states match, then it means that data is authentic, and the operation can pursue.
6. Any user of the system can request a transaction from blockchain and check its compliance with the entries in an ERP system.
7. After receiving a transaction, a user can check that the signed hash value in it corresponds to a specific document (or a set of documents) in an ERP system.

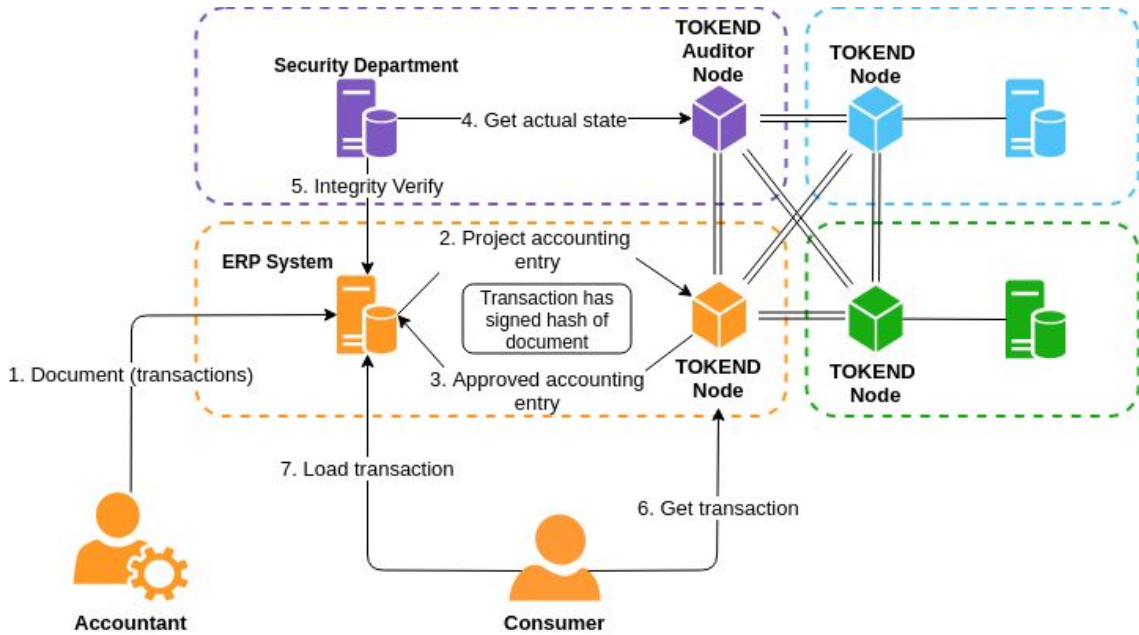


Figure 2. ERP system and TOKEND Nodes interaction workflow

Note: As an additional option, to increase the immutability of digital records, the hash of the TOKEND blockchain could also be written on a public blockchain such as that of Bitcoin.

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About PMPartners

Software and consulting IT company.

The main scope of business: holding automation, optimization of financial departments, optimization of the company's business processes, security audit, digitalization, tokenization. Provides services to large enterprises of Ukraine in the field of Agro, Distribution, Retail, Logistics, FMCG, fast food.

About TOKEND

TOKEND is a white label blockchain software platform that consolidates best practices of tokenization solutions. It allows you to issue, transfer and exchange your assets with a high level of privacy, security, and auditability while following regulations of your jurisdiction. TOKEND is designed for enterprises who are willing to take advantage of tokenization or experiment with the blockchain technology without the need for maintaining the team of blockchain developers, within the shortest time to market, and with minimal risks.