Making Data Honest

White Paper

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ÜLEDGER

ULedger: Data Integrity through Blockchain

Bringing continuity, consensus, transparency, proof and identity to data.

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Abstract

ULedger is an early mover software company in the Blockchain-as-protocol ecosystem, focused on bringing truth and transparency to data by seamlessly making existing data infrastructures Blockchain-enabled. Our focus is providing solutions for our customers that require increasing levels of data protection, integrity and provability for current and future cyber threats and regulations.

ULedger has developed a cutting-edge Blockchain solution that enable our clients to create a permanent, independent multi-party record of any type of data, whether it's an electronic medical record, image, contract, journal entry, email, IoT, Edge Computing or any other type of data. Our audit trail solution logs the creation and activity of data and ties the data to a legal identity (person or thing). The audit trail report allows for easy access to the original data for investigation and proof.

Our Mission:

Make the World's Data Honest

Introduction

ULedger is the future of data integrity. By enabling existing technology infrastructures to be Blockchain-enabled, ULedger facilitates the certification and proof of the integrity of high-value data and documents.

ULedger is based on the idea that every person, company and entity should have their own private, immutable and secure digital ledger. This ledger contains immutable records and transactions where the integrity is certified by the ULedger network and verified as authentic by a multitude of networked third parties. Our technology mathematically certifies the integrity of data, the time it was published, as well as its order relative to other data it interacts with, allowing that data to be trusted.

The ability to trust and rely on the integrity of data in today's technology environments is deficient. The regulatory environment is filled with established regulations to protect against compromised, falsified and inaccurate data. This same data is relied upon for financial, business, safety and other decisions that have significant impact on business and society. In our current technology ecosystem, reactive regulatory compliance and security is the norm and erodes credibility of the underlying data.

The ability to forge, delete or otherwise manipulate data is omnipresent. Organizations and individuals spend countless hours and dollars to protect the integrity of their data and prove the integrity of their data to 3rd parties such as auditors, business partners, regulators and during legal discovery.

Our Blockchain technology offers a mathematically provable solution for certifying the authenticity, reliability, integrity, and usability of documents and transactions in a secure and private manner. ULedger was formed to provide entities and individuals with a means to certify and store data transactions and documents in a way that is immutable, provable and permanent. ULedger facilitates "your" own digital ledger of important documents and transactions, certified by the ULedger Network and attesting that your document or data is what you say it is at a certain point in time and in relation to other data.

ULedger is somewhat unique among other blockchain companies in that we have a working product that has been deployed among a number of customers in various verticals. We have teamed with a Big 4 accounting firm, we count the City of Boise as a customer, and have customers and use cases we are working on in banking, asset securitization, title, water credits, mobile app authentication, cyber security, credit unions and a growing number of other opportunities.

Value Proposition

In short, ULedger provides organizations with a Blockchain upgrade to their existing data infrastructure, allowing them to achieve:

- **High quality data**

  ULedger data is complete, consistent, timely, accurate and widely available.

- **Lower regulatory costs**

  Companies spend less time on money on audits as their data becomes more trustworthy and traceable.

- **Empowered users**

  Users are in control of all their information and transactions.

- **Process integrity**

  Users can trust that transactions will be executed exactly as the protocol commands, removing the need for a trusted 3rd party.

- **Transparency and immutability**

  Changes to the ULedger blockchain ecosystem are viewable, which creates transparency. Each transaction (and correspondingly all the transactions) are unalterable and cannot be deleted.

- **Lower transaction costs**

  ULedger eliminates third party intermediaries and accompanying overhead costs for exchanging assets.

- **Faster contract execution**

  ULedger contracts and transactions can be processed in minutes rather than days.

ULedger eliminates the need for human trust by focusing on the cryptographic integrity of data. It is increasingly difficult to prove where the integrity of data breaks down and pinpoint the source and effects thereafter. In most current systems it is difficult or impossible to prove which of two or more alternative records is real in case of a breach or in case of mal-intended data publishing by rogue data providers. ULedger timely notifies our customers of data inconsistencies and facilitates research into the cause, time and source of the data inconsistency.

ULedger does not need access to your data to certify it. Instead, our solution is based on one-way cryptographic hash functions that represent the data generating UUIDs (Universally Unique Identifier), but are irreversible such that one cannot start with the hash value and reconstruct the data. Complete data privacy is guaranteed at all times.

Not just the data itself is put through this hash function, but also its previous versions' hashes as well as important metadata such as timestamps and GHOST AuxPoW nonces (*see technical description for more*).

Upgrade your existing technology infrastructure to a trustworthy global Blockchain network that asserts and proves the integrity of data.

Market Context

The demand for data integrity across many industry verticals is well established. Any organization wishing to provide itself with a measure of protection from legal or regulatory scrutiny is a potential consumer of ULedger technology.

Many companies operate within industries that already have substantial regulatory obligations and these companies may have already spent substantial amounts of time and money to achieve compliance. An existing set of providers service these organizations currently, but ULedger believes its solution is a compelling alternative to these providers by offering a superior consensus of truth.

Quantifying the Problem

- Bad Data Costs the U.S. $3 Trillion Per Year. Gartner estimates that more than 25% of critical data within large businesses is somehow inaccurate or incomplete. *InformationWeek 2006.* • Bad data cost around 20% of revenues/operating budget. *Australian IT news, 2011*
- A 1% error rate can more than double the cost of all transactions.
- On a micro level, individuals are losing control of their personal information, companies are losing control of their core assets, IPR, and some employees are even losing their jobs (for example, the CEO of Target). The larger cost to the economy is that trust in the digital society goes down.

"No locale, no industry or organization is bulletproof when it comes to the compromise of data." Those words from Verizon's 2016 Data Breach Investigations Report neatly summarized the cyber threat environment today.

Our society continues to invest more in data integrity, however, the problem continues to escalate. ULedger facilitates an augmented protocol for assessing the truth and integrity of data and proving that integrity with the existing technology infrastructure that our customers have.

ULedger Solution & Product Set

ULedger's current product set and anticipated roadmap consists of the following:

- **ULedger Data Assurance:** enterprise-class blockchain-based data certification and 3rd party immutable audit trail, available via REST-ful API. This product is available now and is in active customer use.
- **ULedger SMB & Family:** UI-based access to the Data Assurance product, for use in lower volume situations. A user-friendly UI will be the primary means of interacting with the blockchain in this scenario.
- **ULedger User Authentication:** User authentication via app.
- **ULedger Premium Service:** token-based access to a premium tier of data-certification service in the ULedger network, providing enhanced speed of certification and immutability. This service tier will be built by mid-2018.

Proof

Companies spend countless dollars and hours to prove the integrity of their data to 3rd parties. ULedger provides reporting tools that pull from our immutable Blockchain to research and report on data activity within an organization or individual. Our reporting dashboard allows for researching the activity of data and reporting on that activity. Our reports can be trusted by 3rd parties as the source of the reports is immutable, researchable, and corroborated by multiple sources or nodes.

Compliance

ULedger's Data Assurance solution delivers critical support to regulated entities in meeting Federal & State regulations, numerous compliance requirements and in the absence of specific government regulations, industry specific best practices. ULedger is perfectly suited for any regulated vertical:

- **Pharmaceutical:** DSCSA, FDA Data Integrity
- **Medical (EHRs, EMRs, EPHI):** HIPAA, HITECH, HHS Data Integrity
- **Finance & Securitization:** SEC, FINRA and State Securities Regulations, AML
- **Public Companies:** Sarbanes Oxley
- **Insurance:** Fraud mitigation, NAIC governance, OSRA Filings

In addition to specific industry regulations, the above verticals and many others are expected to implement best practices as well as prepare for implementation of formal rules that are in a comment phase, or those rules that have been approved with a future compliance date.

Document Management

The benefits of our immutable audit trail and data integrity certification also applies to documents submitted to our Blockchain protocol and distributed storage product. This service allows our customers to have a permanent, immutable, time-stamped and certified version of any document. Examples of the documents that need this type of certification includes contracts, identification cards, wills, emails, texts or any other record that would benefit from a 3rd party certification of the integrity and truth of the document for legal, continuity, regulatory or any other scenario where the integrity of a record may be disputed or questioned.

Identity Authentication

ULedger is currently in the process of working on a proprietary identity authentication mobile app. We have created what we call 'three factor authentication' to quickly and efficiently authenticate your identity which can then be bound to your blockchain ledger and any transactions and documents on your ledger. The purpose of this is to prove that you are the owner of the transaction and will allow you to digitally sign contracts, exchange digital records with third parties and easily authenticate yourself to third parties.

Blockchain-Enabled Databases

ULedger enables databases to experience most of the benefits of first generation blockchains such as Bitcoin and Ethereum. Any transactional database can integrate with ULedger to generate an additional cryptographically verifiable audit trail with ULedger. This makes it possible for databases to communicate via APIs or other communication means and attach proofs of their integrity. This means, unlike other Blockchain or DLT solutions, with ULedger there is no need to completely replace your existing infrastructure. You can integrate ULedger with relative ease and without disruption to your processes.

Data Security

Our Blockchain architecture is such that every node records its own version of every participant's audit trail. This means that if there is a discrepancy on a particular audit trail between a node, there is an issue that needs to be investigated. As a result, data discrepancies are identified, investigated and addressed quickly, resulting in quicker resolution. For the system to fail a majority of the ULedger nodes/participants would need to be simultaneously hacked. This is highly unlikely.

Implementation and Interoperability

ULedger is a layer of assurance and security that works seamlessly with your existing document/ Key-Value store, transactional database, or any other technology which is content addressable. There is absolutely no disruption to your current processes. Our server-side approach allows for integration with your existing systems via APIs or direct database integration, depending on the systems you use. Security and trust is a sliding scale with ULedger. It is possible to integrate quickly and easily over a traditional web API with our ULedger SaaS offering which implies that the institution trusts us with the forwarding and storing of the data. The most secure, and trustless approach is for you to install ULedger on your local server and generate your own audit trail of your data, only sharing the audit trail with network nodes.

Scalability

Our technology allows for a highly scalable solution that can handle signing and tracking virtually any discrete data element. ULedger simply adds an independently verifiable, P2P time stamped, append-only audit log to your system.

Company Overview

Intellectual Property

ULedger has filed provisional patent applications on our core technologies, including our approach to ordering of events and our identity authentication method. Contributors / token owners do not receive any ownership of the company's intellectual property.

Product Readiness

Unlike many other projects which are based solely on an idea to raise funds via token crowd sales or initial coin offering without an actual product or at least a proof of concept, ULedger is operational. As of today, ULedger has a functional product, a user base, established business partnerships and market validation.

Some of our early traction includes:
- Teaming with a Big 4 accounting firm
- City of Boise is a customer
- Customers/partners in:
- Banking & asset securitization
- Title
- Water credits
- Mobile app authentication
- Cybersecurity
- Credit unions
- And a growing number of other opportunities

Early Funding & Ownership

The project was bootstrapped with $120,000 of the founders' own savings. The funds were used to develop and produce an MVP. This gave the team a solid foundation to raise an angel round of $600,000 from seven individual angel investors. The funds were spent to improve the MVP to launch to our early adopters.

Participants contribute voluntarily and their participation cannot in any way be considered or treated as an equity investment into the company that owns the project and IP.
Contributors agree with Terms of Service published on www.uledger.co

The ownership of the token does <u>not</u> include the rights to:
- ownership of the company
- ownership of the service's IP
- profits of the service
- participate in decision making, unless options are put up on voting to token holders by ULedger the company.
- The founding team will maintain the majority stake in the project and has a majority vote, thus complete control over strategy as well as day-to-day decision making.

Technology

ULedger leverages a combination of technologies, including: Blockchain data structures, cryptography, PKI, advanced distributed timekeeping processes, and more.

Unlike Bitcoin, Ethereum, or other public Blockchain implementations, we use an advanced cryptographically secure distributed Time Protocol for independent secure timestamping of any data, signed and stored on any mobile device or server. We further make these timestamps together with the data independently verifiable by generating what we call Cross-Merkelization Vector Clocks (see section below about cross-merkelization).

ULedger Blockchain Advantages:
- ULedger does not necessarily need access to the underlying data
- Compatibility with all blockchain platforms and apps due to content addressability of data
- Scalability and bandwidth advantages
- Dynamic reporting of Blockchain proof
- We tie your data to the source of the creator or editor
- Easy integration via open-standards API
- Privacy & security advantages – data not universally shared
- Participants do not need to trust ULedger since the proof is mathematical
- Extends to regulatory uses cases
- Extendable to any data format and file size
- Stateless blockchain approach (no single global state unlike all other Blockchain approaches)
- Possibility for encryption at rest
- Approval from other parties is not needed
- ULedger technology acts as an overlay to an existing infrastructure removing the need to make modifications to or to replace current systems.

Why Our Blockchain Approach is Unique

All other Blockchains try to solve one big computer science problem: the double-spend problem. This can be boiled down to: how do you ensure that if a certain piece of data is sent to one party, that party and everybody else knows who owns and controls it? In other words, what is the true state of the data? This is obviously required for applications such as money (Bitcoin) and shared computation (Ethereum).

ULedger does not seek to solve this problem because we deal with the real world, rather than exclusively Blockchain-internal data. Businesses today depend on each other's data to function, but all data exchanged is purely on a trust basis. If they ever send the same data to multiple recipients with the goal of defrauding them, that is not a technical problem, but a legal one. ULedger seeks to make it possible to verify to third parties that such misbehavior occurred without a trace of doubt. Current cryptographic content-addressable protocols can verify the integrity of the content, but not the origin, time, and relative order of events of the content. This is what ULedger adds.

Smart Contracts

ULedger is a platform engineered to leverage both Ethereum Blockchain technologies and existing signature execution tools and API's to increase efficiencies, enable contract execution and proof, provide transparent agreements between stakeholders and decrease fraud. Our solutions allow something as simple as an email to become a legally binding contract if that is the intent. In that way, ULedger acts as a digital witness in the legal sense of the word.

Additional Unique Benefits

ULedger does not have a single global state such as in Bitcoin or Ethereum. Instead every node generates their own view of the state of the world. The nodes timestamp and verify transactions of neighboring nodes with whom they regularly interact. This process of cross-verifying audits both ensures the integrity of all neighboring node audits, but also "weaves" audits together. It becomes extremely impractical to "untangle" this network of cross-audits very quickly. This weaving process also creates a way for every node to roughly measure time. We view time as an emergent phenomena within the network. The exchange and verifying of data and audit trails does not need to be necessarily all about static data, it can also be used in the future for exchanging application state. This means it becomes possible to start a certain set of computation on one node, and continue with the computation on another node, without having to blindly trust either node.

Current ULedger Use Cases

Our technology has been or is in the process of deploying to customers and or partners in the cyber security, asset securitization, electronic medical records, water credits, accounting, software, title insurance and digital communications use cases.

Our first product, which certifies the integrity of email communication as well as creates an immutable audit log and archival of email communication through our Blockchain, for regulatory and legal purposes, has been in use for nearly one year and continues to add value to our early adopters. We have certified many thousands of communications and our reporting functionality has been effective for proving the "truth" of email streams.

Our current API-based blockchain layer for existing technology infrastructures was launched in beta version in April and is now in Alpha version. We continue to work with our early customers and partners to augment our reporting platform that enables them and 3rd parties to prove data integrity and easily research source data. Our decentralized data storage product continues to add value to those clients that use ULedger to store their data in addition to using our Blockchain solution(s). We are in the process of completing the beta version of our identity authentication mobile app, which we hold intellectual property on. We are also launching an API directly suited for easily adding ULedger to any transactional database, allowing existing databases to add the benefits of Blockchain.

Specific customers or partners include:
- **Big 4 Accounting:** ULedger is teaming with a Big 4 firm in audit, asset securitization and cyber security.
- **The City of Boise:** ULedger and the City of Boise are implementing our technology within their utilities infrastructure and their email system.
- **Vericomply:** Vericomply is an asset management software that is powered by ULedger's blockchain solutions.
- **Medici:** Medici is an Electronic Medical Records company.
- **Panaton:** Panaton is a software development and consulting company that uses our blockchain email solution.
- **WebBank:** WebBank is a leading provider of closed-end and revolving private-label and bank card financing programs.
- **Simility:** Simility is a fraud prevention, machine-learning enterprise grade solution company.

  In addition to the projects listed above, we have other projects in process in mobile app authentication, UETA compliance, CECL compliance, pharmaceutical supply chain, title tracking and compliance and water credits. Each week brings new opportunities.

ULedger Token Utility

ULedger Premium Service

We envision the creation of a token market wherein ULedger tokens (ULD) are spent in exchange for receiving premium service on the ULedger node network.

All ULedger nodes participate in the signing and certification of audit trails belonging to other customers, which allows any node to have their audit trail certified by any number of other nodes. Customer blockchains will broadcast a need for certification, and will receive responses from multiple nodes. They can then obtain as many certifications as they need from the available nodes. Other than paying a license fee for access to the network, obtaining certifications is not something that customers are required to pay for. Customers can be ULedger customers without paying other nodes for inclusion in their blockchains.

However, all nodes are not equal - some nodes are able to certify data more quickly than others, allowing immutability to be achieved more quickly and with fewer transactions. This makes them more valuable to those blockchains that rely on speed or that have very high volumes of transactions to be certified. This relative value will depend on a variety of factors, including the volume of the audit trails for the customers that operate them, the speed of response time for other nodes requesting certifications, and the latency of the network distance separating them from the requesting nodes. These factors will allow each node to develop a proof-of-work index that indicates to other nodes how effective each node is in handling certification requests. It will be possible for immutability to be achieved more quickly if enough of the high-value nodes are participating in the certification process. Because of this, there is an incentive to attract the nodes with the highest certification value to respond to certification requests.

Tokens will be used as the means of gaining access to this premium operating model. It is important to stress that full functionality of the ULedger network, and immutability of records submitted for certification, is achievable without tokens. However, organizations for whom the capabilities described above are important will have the ability to gain access to this premium model in a market-driven manner.

The ULD Token itself will be on Ethereum main chain. If there is ever a fork, we will decide which fork our system will support. Payment transactions themselves can happen on the main chain, but we expect that they will occur on a secondary transaction layer (Raiden). This is because we will need to support micro-transactions.

Token Safety/Security Information

Cybersecurity is a high priority topic in the ICO world after the recent hacks. At ULedger we understand the importance of cybersecurity and work hard to eliminate the risks for our upcoming token sale and future products powered by smart contracts. ULedger will perform code reviews, implement bug bounties, and keep funds and wallets safe. ULedger will use state of the art multi signature hardware wallets to manage received funds in both Bitcoin and Ethereum.

ULedger will publish all public announcements with associated GPG signatures. All announcements will also be anchored in the Bitcoin Blockchain and referenced in each message.
ULedger will also publish the final Bitcoin and Ethereum payment address in this manner. ULedger will not take any responsibility for funds sent to any addresses other than the ones signed by our publicly verified and broadly broadcasted GPG Public Key.

Conclusion

The advent of the internet has revolutionized how we create and share data. Unfortunately, that data hasn't always been trustworthy, costing organizations millions of dollars in time, money and reputational damage. Blockchain is an equally revolutionary technology that will bring trust to data.

Blockchain has struggled thus far to find footing in real-world business use cases as current technology infrastructures are not compatible, or Blockchain technologies are not scalable. ULedger easily enables any entity, whether it's a business, government organization or even an individual, to have their own Blockchain-enabled ledger with data integrity established through mathematical proofs and verified by consensus between ULedger's node network. This allows them to turn their existing technology infrastructure into a trustworthy global platform that asserts and proves the integrity of their data. Due to our Blockchain approach, we are infinitely scalable while truly taking trust out of the equation of certifying the integrity of data. ULedger is the most non-invasive, efficient blockchain technology to hit the market thus far and is built to evolve with technology infrastructures.

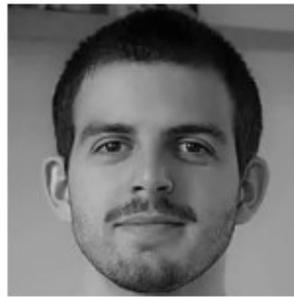# Meet our Team

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