ETERBASE

Europe's Premier Digital Asset Exchange

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Robert Auxt, Martin Smutny, Jozef Brhel

"Either mathematics is too big for the human mind or the human mind is more than a machine."

— Kurt Godël

Vision

ETERBASE a.s. (or ETERBASE) is the company behind the process of building two key products — a robust and fully compliant digital asset exchange branded as ETERBASE EXCHANGE and a new experimental digital asset named ETERBASE COIN (XBASE). The primary focus of the exchange is the full integration of digital assets and real FIAT world via SEPA and European IBAN accounts.

Additionally, there are plans for moving the ETERBASE COIN (XBASE) onto its own mainnet. This will be based on a Directed Acyclic Graph (DAG) that will be able to execute and support smart-contracts aimed at financial services. These will include asset issuance, zero transaction transfers and on-chain custody of various tokenized assets in a reliable and transparent manner. It will also offer a transaction per second (TPS) rate that will surpass traditional blockchains or commercial providers such as VISA or MasterCard.

Keywords: *blockchain, digital assets, digital asset exchange, distributed computing, low latency, fault tolerance, high throughput, Directed Acyclic Graphs (DAG), smart-contracts, market making, trading, order matching and SEPA/IBAN blockchain integration*

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ETERBASE Exchange

The exchange is the cornerstone of the ETERBASE project. As history has shown, when it comes to periods of increased business activity (e.g. panic selling), the load on exchanges is increased by several orders of magnitude.

Many current exchanges suffered severe slow-downs or outages as a result of such activities.

We believe that a good exchange is one that delivers not only for sustained periods of time, but also during unexpected heavy load and peak times.

We have also seen that in many projects, the initial design changed significantly during the development of the final product, and therefore these projects suffer from architectural constraints that make change management and development difficult.

We want to have a robust, scalable and flexible architecture for our exchange.

To support these goals, the design team at ETERBASE has defined seven primary objectives for the solutions behind the technical and architectural choices:

- Own development of key components
- Design to change
- Design to cost
- High throughput
- Low latency
- Ability to partition and scale
- Fault tolerance

We want to deliver, maintain and continually develop our platform, as well as bring new features and experiences to users in the emerging fintech market.

To be able to achieve this goal, we must design, develop and control every critical component of our exchange. We have developed every key component of ETERBASE EXCHANGE in house.

Design to Change

Change is a constant in software development, no matter how much time and money you spent on analyzing or how agile your development is.

This is an undeniable fact. You can minimize the cost of your development by changing your approach to the design. You also benefit from clear, understandable and maintainable source code.

As described in SWEBOK, here are our Software construction fundamentals:

- Minimizing complexity
- Anticipating change
- Constructing for verification
- Reuse
- Standards in construction

We kept this in mind and followed these fundamentals during the design and development of the ETERBASE EXCHANGE.

High Throughput and Multi-Node Architecture

The throughput of the system directly correlates with the cost of the solution. The more a single 'node' in the processing chain can process within a single second, the smaller the number of nodes (and smaller, cheaper variants) are needed to provide the requested overall throughput.

However, the overall throughput of a series of processing steps of the solution equals to that of its slowest performer. It's very important, therefore, that every piece in the chain delivers throughputs of very high standards:

- An in-house developed order matching component that can deliver up to 15 million trades per second on a single node.
- A messaging solution that can deliver up to 20 million messages over the network between two nodes.
- A DB engine that is linearly scalable, with maximum performance limited only by costs.

- We achieved these numbers by focusing on fundamentally minimizing the complexity of each component.

Low latency

Institution often employ algorithmic and high-frequency trading practices. Successful application of some of these methods requires a very low latency.

LMAX was, and still is, one of the highly talked-about exchanges that delivered sub millisecond latencies since 2011 with their state-of-the-art custom-built components.

Since then, several (even open source) components became available on the market that either close the gap or even surpass the parameters that were considered state-of-the-art back then.

This makes it easier to shorten the time-to-market as well as offer similar sub-millisecond latency performances.

Compared to some of the exchanges that were built several years ago, the difference in latencies can be in several orders of magnitude.

Our analysis has shown that most of the latency is spent using message passing between nodes.

Unfortunately, some traditional and widely acknowledged messaging systems can introduce latencies as high as 50-100 milliseconds with each hop, and even worse under high load.

To keep latency low, ETERBASE decided to:

- Develop critical components in-house, including the processing chain with a particular focus on latency;
- pick a simple and very fast open source messaging solution that can deliver latencies well under 100 micro-second, even under high load;
- do most of the processing in memory with a clever persistence strategy;
- minimize the number of required hops as much as possible to not sacrifice scalability.

Ability to partition and Fault Tolerance

These two objectives go hand-in-hand. A better ability (and pace) to fan out and horizontally scale up (or down, for that matter) the number of nodes for any given service improves the exchange's reaction time to peaks.

Also, should one node blow up or slow-down, a well-designed fault-tolerance strategy will ensure that the service is not interrupted, and the failing node is going to be replaced by a healthy node.

Design to cost

This objective encapsulates all previous objectives. We can deliver, operate and further develop the Eterbase exchange, delivering high performance over costs.

Our exchange is infrastructure agnostic (we can run this solution in a public or private cloud), with a great single node performance that allow us to manage costs while maintaining its scalability during unexpectedly heavy loads or sustained growth.

Market Making for Everyone

ETERBASE team will release simple SDKs and open source tools to enable the creation of dynamic orderbooks via APIs. Several hackathons will be planned to engage the community in creating API bots utilizing the state-of-the art ETERBASE API interface.

IBAN and FIAT Integration

ETERBASE a.s. has partnered up with several financial institutions and, with the help of its venture capital investors, it is coordinating closer integration between existing electronic money institutions, offering IBAN functionality for its clients.

ETERBASE is currently in a position to offer synthetic IBAN accounts in major G20 currencies via its strategic partners. The technical implementation is done and tested via API, essentially offering full IBAN functionality to clients of ETERBASE EXCHANGE that are EU residents and have passed bank-level KYC.

ETERBASE and its financial partners will make an effort to offer the most competitive services in the field and will strive to bring complete digital banking solutions to digital assets and crypto in the future.

Debit and Pre-paid Cards

In order to foster utility value for digital assets, we are planning to team up with our partners and introduce the possibility of utilizing pre-paid and debit cards to hold both balances in cash and e-money as well as in digital assets.

ETERBASE Debit Cards Preview

Security Tokens

The ETERBASE team is engaged with several regulators and central banks (as well as their respective fintech hubs) to test both the primary issuance of security tokens and secondary trading.

For this, we will seek to obtain the necessary licensing subject for MIFIDII, Prospectus Regulation and Market Abuse Regulation as defined within the EU legislation in suitable jurisdictions within the EU. Our aim will be to obtain Multilateral Trading Facility (MTF) or Organized Trading Facility (OTF), or any similar type of license for

secondary market trading and clearing of digital assets that can be classified as securities. [3]

Crypto Derivatives

Similarly, as per security tokens we will work closely with regulators to offer the first regulated derivatives for major cryptocurrencies such as Bitcoin and Ethereum in the form of perpetual contracts within the legal framework of MIFIDII. [3]

Initial Exchange Offerings and Launchpad

In order to make the ETERBASE EXCHANGE attractive for new projects, we will initiate a launchpad for Initial Exchange Offerings (IEOs). As its name suggests, IEOs are conducted on the platform of a digital asset exchange. Contrary to Initial Coin Offerings (ICOs), an IEO is administered by an exchange on behalf of the project that seeks to raise funds with its newly issued tokens.

As the token sale is conducted on our ETERBASE EXCHANGE, the token issuers must pay a listing fee along with a percentage of the tokens sold during the IEO.

ETERBASE EXCHANGE will take a percentage of the tokens sold by the project. This way, there will be an incentive to help with the marketing operations of the token issuer.

As per these mechanics, ETERBASE a.s. is planning to create partnerships with several projects that are interested in selling tokens directly for FIAT or want to utilize our additional services.

Licensing and Compliance

ETERBASE will seek full licensing and or registration according to AMLD5 from the Ministry of Finance of the Slovak Republic and the National Bank of Slovakia once the transposition of the EU directive is completed into the national legislation (2020).

ETERBASE team is working closely with the governmental working groups to devise the best possible regime for the local jurisdiction.

ETERBASE Coin

What is the Eterbase Coin?

The Eterbase Coin (XBASE) was originally airdropped by its founders through the Ethereum Network to partners, traders and marketers to incentivize and promote the use of ETERBASE EXCHANGE. The Eterbase Coin (XBASE) has no legal connection to ETERBASE a.s. and it is at the sole discretion of the management to utilize Eterbase Coin (XBASE) or any other digital asset for that matter by the company at any given moment.

According to the ESMA opinion [2] we consider the Eterbase Coin (XBASE) to be a transferable utility token. However, the precise classification might change due to the planned experimental mainnet implementation.

It is also likely that this classification might differ in various jurisdictions.

Eterbase Coin (XBASE) gives no rights to any entitlements of any kind or any decision-making power within the company or on the platform. The only utility of the token is to serve as a trading pair on the ETERBASE EXCHANGE and to unlock bonus features via Premium Memberships if certain conditions are met based on the sole discretion of the management.

Premium Memberships can be obtained via means other than the utilization of Eterbase Coins (XBASE). These two are not legally linked and it is solely up to the discretion of the management of ETERBASE a.s. to enable the features of Premium Membership for individuals. The bonus features of Premium Memberships can be found at the official website: https://www.eterbase.com/exchange/fees/

The Eterbase Coin (XBASE) is currently following ERC223 (Ethereum Network) standard and was audited by several external parties for potential security risks.

ETERBASE a.s. might initiate the sale or purchase of Eterbase Coins (XBASE) at any time in any quantity with its own account, as it might do with other digital assets such as Bitcoin, Ethereum and others.

Additionally, ETERBASE a.s. and its founders do not guarantee liquidity, technical support, security of the code, redemptions, reimbursements or any claims of any kind by third parties for whatever reasons.

For additional information, we will publish an updated Terms and Conditions document and possible legal opinions by lawyers or regulators.

ETERBASE a.s. and its founders reserve the right to implement further changes to the protocol or the utility of Eterbase Coin (XBASE).

Eterbase Coin Distribution

The current supply of the ETERBASE Coin (XBASE) is 1,000,000,000 with 270,000,000 in strategic reserves and 50,000,000 in reserves for technical development.

The founders, however, reserve the right to distribute or sell any or all reserves as necessary at any given time.

Eterbase Core

Historically, blockchains have provided a way to maintain consensus across all nodes with no central authority while providing the immutability of its decentralized ledger.

However, blockchain technology proved to have several deficiencies, especially for a lack of real-time transaction settlement and effective scalability. Despite all the efforts, the main blockchains such as Bitcoin and Ethereum synchronize only one block at a time, which results in a very slow confirmation rate.

In order to address these issues and ensure real-world utilization of DLT technologies ETERBASE will develop a new solution built upon the Directed Acyclic Graph (DAG)-based Smart Contract platform – nicknamed Eterbase Core.

The architecture will be based on improved versions of existing DAG-protocols and multi-node, multi-threaded, asynchronous architecture as currently deployed in ETERBASE EXCHANGE. The aim is to run primarily decentralized financial applications (DFApps) on the top of the chain with zero transaction fees and near instant settlement, with speed reaching above 250,000 transactions per second. The Byzantine Fault Tolerance (BFT) will be utilized for consensus.

ETERBASE is planning to utilize its experience with the JAVA programming language that compiles to smart contract level bytecode on the Eterbase Core. Additional information will be provided in the future as the development of Eterbase Core will progress.

The Company

Established in Slovakia, ETERBASE a.s., with its registered offices in Bratislava, is a Slovak joint stock company ("akciova spolocnost") and is entered in the Slovak commercial register under the corporate number ICO 52 380 505.

More detailed information can be found in the **official company registry**:

http://www.orsr.sk/vypis.asp?ID=463070&SID=2&P=0

The intellectual property is wholly owned by ETERBASE a.s. and it incorporates the main software components as described in this paper.

Governance Structure and Management

ETERBASE a.s. is governed by its executive team and a corporate board of directors, as identified in the official registry mentioned above.

The management team:

Jozef Brhel — Chairman of the Board

Robert Auxt — Vice-Chairman of the Board and Chief Executive Officer

Martin Smutny — Member of the Board and Chief Technology Officer

Data Protection

All data subjects, whether individuals or companies, will have the option to request an absolute removal of all their data that is guaranteed by a third party and fully verifiable.

All communication between server and client is fully encrypted. Pseudonymization will be applied via a separate module within the ETERBASE EXCHANGE architecture, thereby guaranteeing maximum data protection and control for our clients and partners in strict compliance with Regulation (EU) 2016/679.

Additionally, ETERBASE will appoint an independent and professional Data Protection Officer (DPO) who will be responsible to monitor all data subjects on a wide scale continuously and systematically.

AML/KYC policy

The Anti-Money Laundering (AML) and Counter Terrorism Financing (CTF) policies are designed to prevent money laundering and terrorism financing by meeting the European AML legislation standards, including the need to have adequate systems and controls in place to eliminate or at least mitigate the risk of the firm being potentially used to facilitate illegal financial activities. Internal AML Policy will set out the minimum standards, which must always be complied.

The cornerstone of the AML policy will be an appointment of an independent Counter Terrorism Financing and Money Laundering Officer (CTFMLO), with strong experience in security, compliance and counter terrorism, who will have the responsibility of overseeing compliance with relevant legislation, regulations, rules and maintaining a Risk Based Approach (RBA) towards monitoring and managing the money laundering and terrorist financing risks to ETERBASE.

Secondly, we will require an enhanced and strict risk-based customer screening process: due diligence, identification, verification and know your customer (KYC) procedures, including in depth due diligence and with continuous monitoring for those customers who present higher risk.

ETERBASE a.s. is strictly prohibited from transacting with individuals, companies and countries that are on prescribed sanctions lists, the company will therefore screen against United Nations, European Union, UK Treasury and U.S. Office of Foreign Assets Control (OFAC) sanctions lists in all jurisdictions in which we will or might operate.

Expansion Strategy and Stock Exchange Listing

ETERBASE and Patria Venture Capital, are in the process of establishing a regulated Fund under the name of Digital Asset Corporation.

The Fund (Digital Asset Corporation) will be managed by one of the largest Czech administrators of qualified investors funds (AVANT investiční společnost, a.s. or AMISTA investiční společnost, a.s.).

The Fund will be regulated by the Czech National Bank and will issue investment shares offering to Qualified Investors up to 20% of issued investment shares corresponding to overall issue price in the amount of EUR 10.000.000.

These shares will pay dividends and will be available for trading on the Prague Stock Exchange.
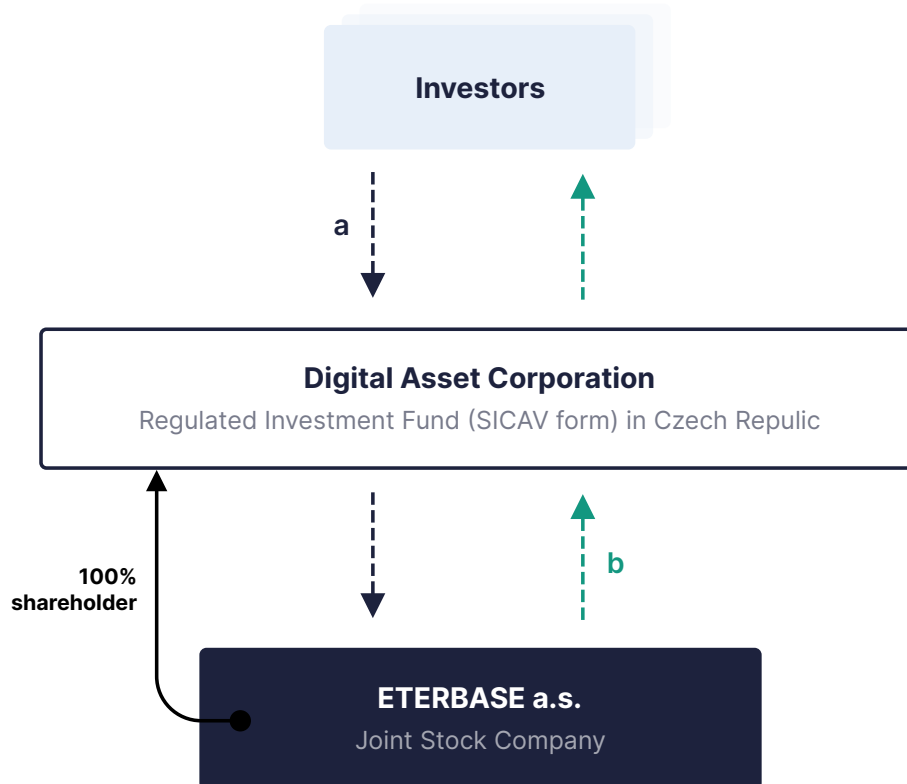
a. Subscription of investment shares by Qualified Investors, Investment shares available for Qualified Investors: Investment shares will pay dividends. Fund will invest into further development of ETERBASE, a.s.

b. SICAV (from French – "société d'investissement à capital variable") will be 100% shareholder of ETERBASE, a.s. and will distribute profits from ETERBASE, a.s. The Fund will pay dividends to Qualified Investors. Investment shares of Digital Asset Corporation will be available for trading on Prague Stock Exchange.

Vision and Objectives

This paper describes only the current vision for the ETERBASE project.

While ETERBASE a.s. intends to attempt a realization of this future vision, please recognize that it is dependent on many factors and subject to substantial legal, regulatory, and technical risks.

It is entirely possible that the ETERBASE vision will never be implemented, or that only a portion of our vision will materialize.

ETERBASE AG and its founders, therefore, do not guarantee, represent or warrant any of the statements in this white paper, because they are based purely on our current expectations and assumptions, about which there can be no assurance due to various anticipated and unanticipated events that may occur.

ETERBASE EXCHANGE is only intended for professionals and experts in blockchain-based software or trading systems.

For any additional information and to check the current status of the ETERBASE EXCHANGE, please visit the official website.

Resources

[1]   SWEBOK: https://www.computer.org/education/bodies-of-knowledge/
software-engineering

[2]   Bitfinex doing 1 mil orders / sec: https://www.coindesk.com/bitfinex-
alphapoint-integration/

Binance claims to process 1.4 mil orders / sec: https://www.bloomberg.com/
news/articles/2018-03-05/crypto-exchanges-raking-in-billions-emerge-as-
kings-of-coins

NCX exchange: https://medium.com/@internationalcryptox/matching-engine-
tps-and-latency-metrics-from-the-incx-lab-86a13781031c

https://martinfowler.com/articles/lmax.html

[3]   https://www.esma.europa.eu/sites/default/files/library/
esma22-106-1338_smsg_advice_-_report_on_icos_and_crypto-assets.pdf

Contact Details

ETERBASE a.s.
Hurbanovo námestie 3
811 06 Bratislava
Slovakia, European Union

Website
ETERBASE.com

E-mail
info@ETERBASE.com

Facebook
facebook.com/ETERBASE

Medium
medium.com/ETERBASE

Telegram
t.me/EterbaseExchange

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