Whitepaper

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Abstract

The digital asset space has seen explosive growth over the past year, with average daily exchange-trading volume across all crypto assets surpassing 18 billion USD equivalent and total estimated market cap for blockchain instruments exceeding 325 billion USD equivalent as of April 2018.[1] Over 200 crypto-focused hedge funds have been formed as of February 2018, while traditional trading houses continue to express interest in increasing their exposure to blockchain assets.[2] But crypto investors continue to lack a number of crucial tools that will be necessary for the space to achieve its potential. Key among these are professional-grade trade execution, compliance, position and risk management, and reporting functionality.

The large number of digital asset exchanges helps drive the growth of the market while simultaneously exacerbating its challenges. Currently, crypto investors are forced to choose among many exchanges when executing various trades. Often, portfolios develop positions on multiple trading platforms with varying user interfaces and functionality. Executing orders across these various exchanges is often difficult. Position and risk management are likewise made more challenging by the diversity of platforms that must often be used to trade for a single portfolio. Because it is difficult to harmonize the outputs of different platforms, meeting reporting and compliance requirements can present significant obstacles for crypto investors as well.

Caspian is a joint venture between Tora Trading Services Limited (and its affiliates, "Tora"), a global leading cloud-based front-to-back technology provider to buy side institutions; and Kenetic Trading Systems Limited (together with its affiliates, "Kenetic"), a leading blockchain and cryptocurrency investment firm. It provides institutional and experienced investors with a full-stack crypto trading and risk management platform. It equips digital assets investors with a comprehensive Order and Execution Management System (OEMS), Position Management System (PMS), and Risk Management System (RMS), backed by experienced support team. The platform, which has the potential to drive further participation in crypto-trading, provides sophisticated connectivity and interoperability across various digital asset exchanges. On the back end, it offers unified compliance and reporting functionality that enables users to analyze all of their trades in one place, regardless of which exchange they take place on.

[1] (17 April 2018) Coinmarketcap.com <https://coinmarketcap.com/currencies/volume/24-hour/>

[2] Maya Keidan, Jemima Kelly, *Number of crypto hedge funds surges amid bitcoin volatility* (15 February 2018) Reuters <https://www.reuters.com/article/uk-hedgefunds-bitcoin/number-of-crypto-hedge-funds-surges-amid-bitcoin-volatility-id USKCN1FZ189>

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Problem: Current Market Challenges

The digital asset space has grown exponentially since Bitcoin launched in 2009. As of April 2018, average daily trading volume across all digital asset exchanges exceeded 18 billion USD equivalent, with total estimated market cap for blockchain instruments surpassing 325 billion USD equivalent.[3] Market analysts expect that number to grow to 10 trillion USD equivalent by 2033.[4] While the size of the crypto space remains small compared to traditional asset classes, the growth in this sector is unparalleled.

More than 200 exchanges are currently active.[5] Of these, five exceed 1 billion USD equivalent in daily trading volume, and 19 have more than 100 million USD equivalent daily trading volume.[6] It would be almost impossible to attempt to list all of the tokens that have been issued to date. The top 16 coins alone each have market caps of over 1 billion USD equivalent, and among those, four coins see a daily volume of more than a billion USD equivalent[7].

[3] (17 April 2018) Coinmarketcap.com <https://coinmarketcap.com/currencies/volume/24-hour/>

[4] Evelyn Chang, *One stock analyst's $10 trillion bull case for cryptocurrencies* (4 January 2018) CNBC <https://www.cnbc.com/2018/01/03/one-stock-analysts-10-trillion-bull-case-for-cryptocurrencies.html>

[5] (17 April 2018) Coinmarketcap.com <https://coinmarketcap.com/exchanges/volume/24-hour/all/>.

[6] (17 April 2018) Coinmarketcap.com <https://coinmarketcap.com/exchanges/volume/24-hour/all/>

[7] (17 April 2018) Coinmarketcap.com <https://coinmarketcap.com/currencies/volume/24-hour/>

It is therefore reasonable to expect fragmentation of both tokens and exchanges to be a persistent feature of blockchain markets in the near to medium term.

Unreliable Trade Execution

Executing trades in the crypto market currently poses a number of challenges, of varying complexity, to investors. At a basic level, the current fragmentation of digital asset exchanges, coupled with relatively low trading volumes compared to traditional markets, often creates problems around liquidity and slippage. Even comparatively small order sizes have the potential to consume available liquidity, causing significant slippage from the current market price. This can lead to high trading costs for market participants.

Because most existing digital asset exchanges began as small ventures and have grown organically as the market has surged, they often cannot handle large order volumes. As a result, exchanges often suffer from high latency. In the case of institutional traders in particular, this has the potential to undermine investment strategies if it causes delays in executing trades.

Additionally, because of the grassroots origins of most incumbent exchanges, outages often occur as a result of the

stresses of high trading volumes. There have been numerous cases of users being locked out of exchanges, in some cases for days, due to technical difficulties.[8] In many cases, exchanges lack adequate customer support, which can increase frustration on the part of traders.

Beyond periodic performance failures, trading, particularly across both traditional and digital asset venues, presents a number of other difficulties. Regulated exchanges now list instruments such as crypto futures, and we expect this trend to accelerate as publicly-traded companies increase their exposure to crypto and additional derivatives arise. This requires purchasers to have the ability to access both traditional and digital asset exchanges and to fluidly exchange fiat for digital assets and vice-versa. Many of these products are also highly regulated and may not be available lawfully.

The ability to rebalance portfolios presents another challenge for investors trading across disparate exchanges. Traditionally, rebalancing is a tool used by investors to ensure that trades are made that maintain certain allocation targets across a portfolio that is constantly fluctuating. In the digital asset space, the fragmentation of exchanges makes this difficult, because no platform currently exists that can monitor capital deployments for a single portfolio transacting on multiple exchanges.

Lack of Security

All digital asset traders are aware of the security risks that currently exist in purchasing digital assets. Exchanges are vulnerable to hackers, a risk that has been born out in a series of thefts resulting in the loss of over 4 billion USD equivalent since 2011.[9] Existing exchanges lack many of the customer protections offered by trading platforms in traditional markets. These include effective customer support and risk management capabilities.

Risk management is a crucial element of trading in any asset class, and it, takes on added dimensions for the digital asset space. These include the counterparty risk that is present when transacting on any individual exchange. Traders must make contingencies to mitigate the likelihood that an exchange will suddenly fail, taking investor funds with it. Market participants must also account for liquidity risk. The fragmentation of the market leads to situations in which there is insufficient liquidity on a given exchange to fully exit a position.

Lack of Reporting and Compliance

All fund managers recognize the need for strong compliance procedures. Crypto funds are no exception, but the fragmentation that exists among the various exchanges can make satisfying these needs difficult. The aggregated information required is simply

[8] Olga Kharif, *Biggest Crypto Exchanges Hit by Delays With Demand Surging* (30 November 2017) Bloomberg https://www.bloomberg.com/news/articles/2017-11-29/biggest-u-s-crypto-exchange-hit-by-delays-as-demand-surges)

[9] Steve Stecklow, *Chaos and hackers stalk investors on cryptocurrency exchanges* (29 September 2017) Reuters (https://www.reuters.com/investigates/special-report/bitcoin-exchanges-risks/)

not available. This leaves market participants in difficult circumstances in which they must contrive individual solutions to this problem. In some cases, this can mean maintaining a spreadsheet to keep track of a trader's or fund's various investments, or developing their own reference lists to determine current pricing or other necessary metrics. This obviously creates significant risk of error.

Institutional entities are also required to keep extensive audit records for both internal and regulatory purposes. The details are often granular to the level of individual traders, triggers to pre-trade limits, and order amendments. These outputs are not available on most crypto exchanges, and as a result, funds must build proprietary systems at significant expense in order to monitor and log all activity. Institutional investors must also provide regular reports to other investors and stakeholders regarding exposures, liquidity risk, portfolio returns, value at risk, summary of performance, and future outlook. Current exchange fragmentation can make this difficult.

In addition to regulatory and reporting requirements, investors need to be able to monitor their positions on an up-to-the-minute basis. Currently, they can only achieve this by watching each platform simultaneously. There currently is no consolidated system for monitoring positions across different exchanges.

As many funds are also sold through regulated entities and/or regulated themselves, the quality and security of custody, as well as other prudential standards such as financial crime compliance are particularly important.

An opportunity clearly exists to provide investors with the tools to address the crypto market's current shortcomings. As the space grows and institutional players increase their exposure to crypto instruments, the demand for such tools will grow stronger.

Solution: An Institutional Grade Crypto Trading Platform

Caspian is an ecosystem designed to solve the problems facing crypto investors using a single, user-friendly interface. It achieves this by providing sophisticated connectivity and interoperability across various digital asset exchanges. Caspian is expected to drive further growth in digital asset participation on the part of institutional and experienced investors. Caspian equips investors with a comprehensive OEMS, PMS and RMS, backed by comprehensive customer support. Its features include professional-grade execution, position management, and reporting capabilities.

Caspian is not designed to disrupt the current digital asset space or to compete with existing exchanges. Its purpose is to support purchasing of digital asset instruments in a reliable manner to a large number of entrants, helping to bring liquidity, volume, and dynamism to the sector.

Caspian is a joint venture between two firms, Tora and Kenetic, each of which have successful track records in asset management and cryptocurrency investing. Tora is a leading supplier of asset management technology, including an OEMS that averages monthly notional equity volume exceeding US$100 billion and is currently responsible for 17% of Japanese institutional equity trading volume. The company, with connectivity to over 150 equities and derivatives exchanges, as well as clients in North America, Asia, Europe and Australia, is ideally positioned to launch Caspian, which will be the first large-scale institutional infrastructure specifically aimed at traditional asset management firms, and market makers.

With over six decades of collective experience building and managing technology and trading systems, Caspian's senior management team is uniquely positioned to build a strong, flexible, secure platform capable of attracting participation on the part of major traders and market makers. Caspian currently connects to over 10 major digital asset exchanges. The platform plans to add up to forty additional trading venues by Q3 2018. Additional details can be found in the roadmap section of this document.

Team Overview

Caspian's senior management team brings decades of combined experience in finance and technology. Members of the Caspian team have held senior roles at well-known investment firms and technology companies, and several were early adopters of blockchain technology. In their respective roles at Tora and Kenetic, they have proven their ability to work effectively together building financial and trading solutions that have achieved major success.

Michael Lerch, *Chairman*
Founder and CIO of Evolution Capital Management and founder of Tora. Prior to founding Evolution and Tora, Mike worked in a number of senior management and trading positions at bulge bracket investment backs. Mike holds a B.A. in Politics from Princeton University.

Robert Dykes, *CEO & Co-founder*
Tora CEO for the past 14 years. Prior to that, Robert spent 11 years in the enterprise software and high-tech industry in Europe, North America, and Asia at such companies as WebPartner and Audiosoft. Robert holds a B.A. in Economics from Princeton University.

David Wills, *COO & Co-founder*
Kenetic COO since inception. Prior to that, David spent 10 years as Managing Director and Head of Asia Trading at Och-Ziff Capital and was the former chairperson of HKeX Hedge Fund market council. David holds a B.A. in Psychology and B.Comm. in Finance & Economics from the University of Sydney.

Gerrit van Wingerden, *CTO & Co-founder*
Managing Director at Tora for the past 12 years. Prior to that, Gerrit managed the development of high volume trading applications and analytical tools for various hedge funds and bulge bracket investment banks. Gerrit holds a B.S. in Computer Science from Stanford University.

Paul Catuna, *CFO*
Tora CFO for the past 10 years. Prior to that, Paul held senior financial positions at WAGIC, Intertop, and Isonics. Paul spent the first 9 years of his career in public accounting, last serving as Senior Manager at Deloitte. Paul holds a B.S. in Business – Accounting from California State University, Fresno and is a certified public accountant.

Jehan Chu, *Chief Strategy Officer*
Co-founder and Managing Partner at Kenetic. A former front-end developer with over 10 years' experience in web and enterprise application development. Jehan founded the Ethereum HK community (2014), and co-founded the Bitcoin Association of Hong Kong (2014). Jehan holds a B.A. from Johns Hopkins University.

Beyond its experienced management team, Caspian is supported by the resources of both partners in the joint venture, Tora and Kenetic. Between Tora's leading OEMS global trading platform and Kenetic's industry-leading expertise in blockchain, the Caspian full-stack digital asset management solution is backed by a full team of over 150 people.

Key Features and Benefits

This section outlines the Caspian model as currently envisaged and designed, but is subject to modification

Caspian effectively aggregates prices, bid/ask information, orders, positions, accounts, and executions from multiple crypto exchanges and other sources, presenting the information on a single platform. It allows users to act on this information by sending orders to exchanges individually or using a Smart Order Router based on existing Tora technology.

The benefits of the Caspian platform can be organized into three overarching categories corresponding to the current needs of the crypto-trading space: Execution, Position Management, and Compliance. Further enhancement plans are described in the roadmap section of this document.[10]

Execution

OEMS: Caspian provides a unified control center optimized for fast trading, which will serve as the main hub for portfolio managers and traders. It is based upon technology built by Tora to serve its large client base, and has been enhanced to cater to the specific needs of the crypto space. This single interface provides the following:

- Access to selected major digital asset exchanges through a single interface. For each specific exchange, OEMS enables access to all order types, asset types, and ticket sizes supported by a given exchange.
- APIs allowing traders to stage and send orders and slices; obtain order, execution, and position information; and receive pricing information, exposure breakdowns, and other transaction information. In the future, the API will be enhanced to allow access to margin information, additional Smart Order Router (SOR) control, and other metrics.
- Ability to view prices, bid/ask, and depths for each exchange to the smallest available ticket size.
- Ability to stage, send, and amend orders in multiple ways, including single-click orders sent directly from the price depth; user-defined order shortcuts; and order staging and slicing.
- Choice of whether and how to use Caspian's SOR.
- Ability to stage order intentions as parent orders, slicing them as child orders that can be sent to different exchanges separately or via Caspian's SOR. This can be used to optimize slippage and liquidity consumption at each exchange.
- Messaging functionality for each order-related action, communicating any potential compliance breach.
- Ability to view and manage margin across multiple exchanges.

[10] Unless specified otherwise, all features described here are available in the system as it is now, e.g. from day one.

- Ability to view the progress of each order or order slice. Users can receive alerts about slippage or time-to-fill, allowing them to take action depending on market conditions.
- Position information for each crypto pair or instrument, enabling traders to quickly react to market conditions using Caspian liquidation features.
- Ability to utilize workflows across multiple distinct users and user roles. A single organization can assign different roles to its members, e.g., portfolio managers, traders, compliance officers.
- Audit report generation for all activity in the OEMS.

As part of its 12-month roadmap, Caspian also plans to add pre-trade Transaction Cost Analysis (TCA) checks to identify which exchanges will be the most apt to execute orders that need to get filled.

Smart Order Router (SOR): This module enables users to view all exchanges as **a single pool of liquidity.** The Smart Order Router sends an order with a given objective - for example, sell ETH and buy BTC within a certain price limit - to multiple exchanges at once in order to achieve quick execution even in the case of large orders. The SOR algorithm is smart enough to prioritize exchanges based on criteria including price, liquidity, and commission so that the best outcome can be achieved with as little slippage as possible.

Algorithms: Caspian builds upon Tora's algorithm framework and Kenetic's trading expertise to provide institutional-grade algorithms from day one. Each order can be assigned to a particular algorithm, which can then route slices across multiple exchange venues using Caspian's smart order routing logic. Traders can control the behavior of a trading algorithm by applying set parameters, and can monitor its performance throughout the lifecycle of the order. At the same time, more sophisticated traders can also closely monitor all orders that the algorithm engines slice to the market. They can manually override order parameters in order to fine-tune the behavior of a given algorithm.

User-built strategies: In addition to the predefined complex strategies offered in Caspian's algorithm suites, end users will have the ability to define their own strategies for managing orders using a simple rule-based language. For example, a user could create an order that executes if the price of an asset increases by 10% or more in an hour.

Alerts: Caspian offers a built-in mechanism allowing clients to configure alerts, which can appear as pop-ups or be delivered as emails. Clients have the freedom to define the conditions under which such alerts are triggered, combining indicators, order parameters, position data, and market data. This logic is built on top of a proprietary coding language similar to Excel functions.

Position & Risk Management

PMS and RMS: Caspian's PMS and RMS together allow users to monitor their positions, P&Ls, and exposures and to maintain detailed records of each. They sit downstream from the OEMS, which sends them all execution and order information. While the OEMS is designed to be light and nimble for fast trading, the PMS and RMS record and track every piece of data in

perpetuity. This allows an investor to view all of its positions and historical data at any time. Using these features, users can maintain a complete book of records for a given trading entity and can view the data in real time or historically. In the future, existing risk features from the Tora platform will be ported to Caspian, including value at risk, shift scenarios, and stress test scenarios.

Reconciliations: Caspian's detailed, user-friendly recordkeeping functions make it easy to perform reconciliations. In traditional finance, the presence of multiple counterparties, including brokers, custodians, and fund administrators, requires reconciliation among all parties to ensure that all transactions have been carried out as agreed. This is also true in the digital asset space, where the difficulty or impossibility of rolling back transactions means the ability to recognize and correct errors is critical.

Rebalancing: This function, currently being ported over to Caspian as part of the company's short-term roadmap, applies to multiple scenarios. For example, when a fund needs to invest or divest funds without altering the relative allocation of each asset within the vehicle, a separate order must be created for each instrument. Alternatively, a fund may employ a strategy dictating a certain ideal level of exposure per currency or per exchange. Inevitably, funds drift from those targets, and rebalancing can help generate orders that continually bring the fund back in line with its objectives.

Allocation engine: The allocation engine allows trading through a single order and a single exchange account, even if the result of the trade is intended to be distributed to different funds, portfolios, strategies or other business units. The allocation engine transparently handles all aspects of the distribution of the outcome of a trade into corresponding business units, allowing the trader to focus on achieving the best execution for the order. The allocation engine covers a wide range of use cases, including:

- Static order allocation, which enables the allocation logic of an order to be defined on a per-share, percentage, or per-NAV basis.
- Dynamic position-based allocation, which allocates trades in line with rules applied to whole portfolios and business units.
- Ensuring a fair price distribution across business units.

Compliance and Reporting

Compliance Engine: The compliance engine is based on Tora's proprietary technology, which offers extremely low latency and extensive functionality, as well as a robust framework that allows Caspian to implement new limits and compliance rules quickly and efficiently. The compliance engine provides multiple levels of functionality to address user defined limits and rules covering both pre-trade and post-trade workflows.

- Pre-trade limits, which include simple limits as well as more complex portfolio or trading parameters such as exposure limits. These limits can delay order execution until compliance checks are complete. They can be triggered at various stages of a trade, including staging, sending, or amending an order. There are three

levels to the limits: warning limits, which can be overridden by the user; approval limits, which require a supervisor to approve the order before it can be sent to market; and absolute limits, which cannot be overridden.
- Post-trade compliance includes alerts, monitoring, and reporting. Alerts and reports can be delivered to users via email or other mechanisms, either on a schedule or as they occur.

Reporting Engine: From day one, Caspian will feature robust reporting capabilities, consisting of simple "flat file" reports such as trade files, snapshot reports, position data, audit reports, and compliance reports. These options offer flexibility in preparing graphical reports and other external-facing materials.

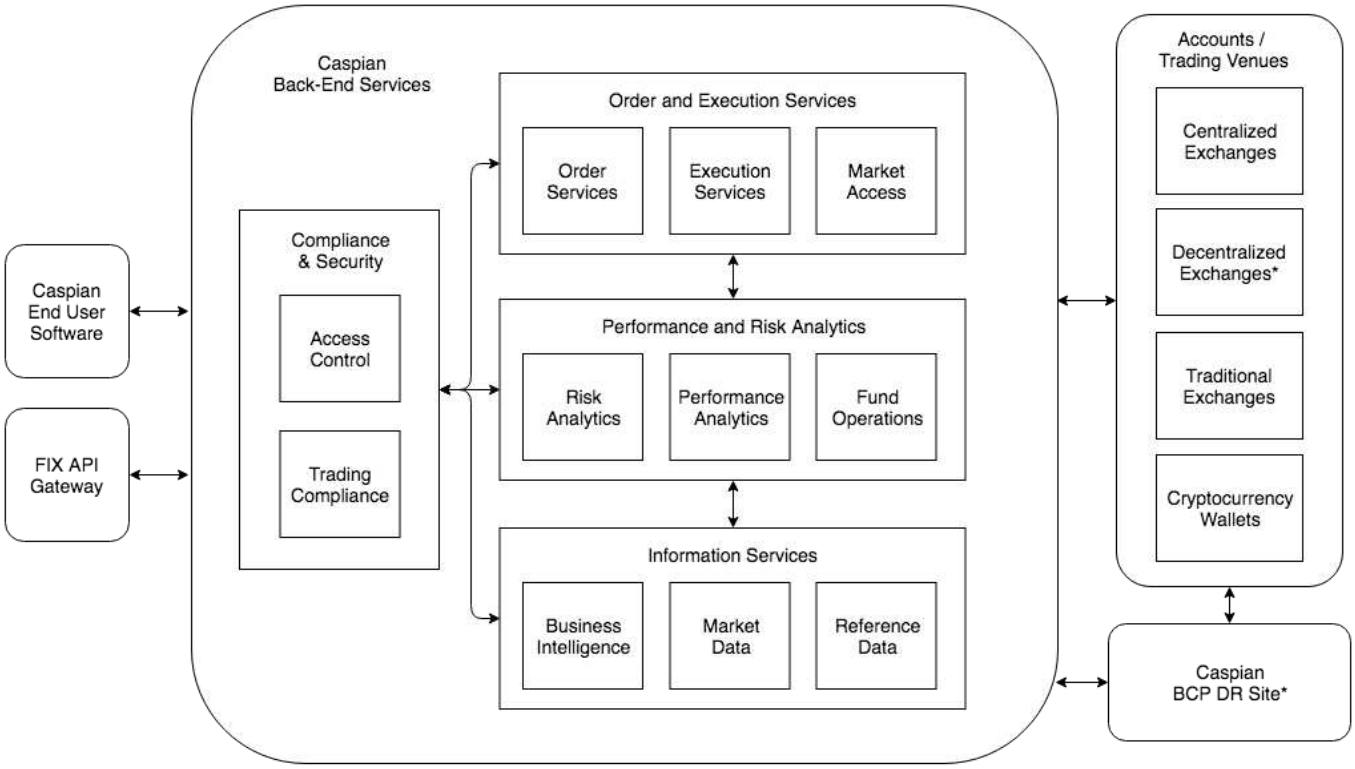
As part of our roadmap, we are also working on a solution that incorporates Tora's proprietary reporting engine to allow users to design report templates including graphs, editable tables, and filtering. Users can then schedule and receive graphical reports directly in PDF, in Excel format, or in Powerpoint.

Importation of Data: Caspian's various modules import the data provided by each exchange via its protocols and APIs, focusing the information into a single portal which users can use as a "one-stop shop." This includes execution data, instrument information and instrument prices (both real-time and mark-to-market), margin and account information, and volumes and liquidity information.

Online Dashboards: Once Caspian integrates the Tora Reporting engine, it will be able to harness a number of associated dashboarding functionalities. In particular, it will enable customizable web dashboards, enabling users to:

- View web-based visualizations on an ad-hoc basis, including exposure breakdown graphs, margin reports, and order fill status.
- Amend visualization in real time by adding formula columns to tables or changing chart types.
- Save their amended visualizations as both a new report that can be scheduled and sent as a file, and as a new dashboard that can be viewed online.

Technical Summary



* Planned functionality, currently in development

Architecture

Caspian is a cloud-based platform, with distributed services built around a microservice architecture, and functionality accessible via thin UIs and APIs. This creates significant flexibility, allowing the platform to accommodate solutions ranging from private clouds hosted in a client's traditional datacenter to environments supporting large numbers of clients hosted on cloud computing platforms provided by established players in the space.

Each aspect of the system is managed by a distinct service with a dedicated communication channel, its own API, and a built-in protocol for subscribing to its data. On the back end, the services are either configured to run in dedicated processes, or several (usually related) services can be bound together to run into a single process. The services can offer data through both a request/reply and a publish/subscribe mechanism.

The backend services are linked by a high speed, certified message delivery technology. This offers a range of advantages:

- Decoupling of services that do not require mutual awareness of the components that act as their clients.
- Plug-and-play architecture enabling the addition of new components to handle new services.
- Ability to set different communication priorities for various services.
- Scalability: the plug-and-play architecture makes it easy to add new service instances capable of handling greater loads or accommodating more clients.
- A built-in mechanism that guarantees no data is lost traveling between the various components.
- High data throughput.

Performance

The system is designed to handle large volumes of data while ensuring low latency for messages on their way to and from the exchanges. While Caspian was not initially designed for high frequency trading, the capacity and latency numbers it can achieve nonetheless approximate the performance such a client would need. Specifically, Caspian is designed to handle up to 50,000 orders and 400,000 executions per day per user, with a throughput of over 2,500 orders per second.

Scalability

Caspian partitions data and communication channels into distinct spaces for each client. These silos can be further refined into narrower categories based on the needs of each client, according to relevant criteria (regions, types of products traded etc).

- Backend services are configured to handle one or more such partitions, aiming to keep the load of each instance below a set threshold, with setup closely monitored. If an upper capacity limit is reached, re-partitioning occurs and new instances are automatically or manually launched (depending on specific client needs) to cover the new distribution.

Reliability

Reliability is a key strategic priority for the Tora system upon which Caspian was built, leading to 99.99% uptime in the past ten years of operation.

This is achieved via a number of complementary functions:

- Fault tolerance and high availability: all critical Caspian services have built-in redundancy and replication, ensuring a resilient architecture with no single point of failure. A standby instance is always ready to seamlessly take over, avoiding any disruption in the event of a problem.
- Load balancing: the services are exposed via a load balancer, which runs a routing algorithm to redirect any request to the least contended gateway instance, which is most capable of handling the request at the time it is made.
- Business Continuity Plan/Disaster Recovery (BCP/DR): for the low-probability but high-severity risk of a major failure that could render the primary site unreachable or unusable,

Caspian will offer a backup cloud. This disaster recovery environment will constantly be updated to mirror the state of the active cloud, and will be ready to take over if activated, avoiding any disruption to end users.

- Tools and processes: no matter how much effort is put into the proper design, implementation, and quality control, we acknowledge that there is no perfect software and there is always a chance something may go wrong. To handle such unforeseen issues, Caspian has built-in "safety nets" and control mechanisms. Various "health check" jobs and sanity tasks are run automatically on a regular basis. Notifications are then sent to the production support team, which will preemptively take the necessary corrective measures.

Security

Security is paramount. In order to ensure the privacy and integrity of all data flowing through the Caspian ecosystem, the following features are in place:

- Connectivity between the client application and the cloud is created by a private leased line or by encrypted connections over the internet,
- The client app access can be limited to only from a set of concrete whitelisted IPs.
- Secure user sign-in is enforced through "strong" password complexity requirements and two-factor authentication.
- Access to the back end is restricted to a limited number of authorized administrative and support users.
- Integration with an isolated exchange API "signing" service, which securely stores the end user's exchange API keys and handles the message signing without exposing the keys in the vault.
- Connections to exchanges or third-party systems are always encrypted when supported by the exchange, regardless of whether the messaging is handled via FIX, REST or any other proprietary protocol.

Support

Any solution is only as strong as the support around it. On this front, the digital asset space has been historically weak. Caspian will leverage the resources of Tora and Kenetic to offer a professional, multilingual product support team based on an initial Service Level Agreement. All issues are sorted according to their Service Impact Level, with anything that affects trading activity assigned the highest urgency. Tora has an excellent track record working with demanding clients in the traditional finance world, resolving or providing workarounds to critical issues within minutes in most cases. Caspian's support team is skilled and experienced at using enterprise software to provide a level of support unparalleled in the digital asset space. Senior developers are rotated among support teams so that both level 1 and level 2 Support issues can be handled intraday with no delays.

Ongoing development and adaptability

An advantage and a challenge to the crypto space is the rapid pace of change. Any solution must be able to quickly adapt to new tradable products, new exchanges, new

digital assets, and new technologies. In many cases, this requires actual development, making a skilled, flexible, and adaptable development team even more critical. By leveraging Tora's development team of over 150 people, Caspian offers this flexibility. The team employs the Agile methodology, with short, efficient 2-week development cycles ("sprints"), allowing Caspian to swiftly and efficiently adapt to any changes.

Audit

Having systems that are auditable is a must for institutional clients. Every action in the Caspian system is timestamped and recorded, providing a detailed audit trail, where any information like the time, the user and the nature of the change can be consulted at a later juncture, enabling the clients to track any change back to its origin while providing sufficient information for any regulatory audit.

Modularity and Third-Party Integration

While the Caspian solution is designed to be a one-stop, turn-key solution for the digital asset space, any of its modules can easily be connected or integrated with other third-party systems and solutions, including digital asset exchanges, risk management systems, and proprietary portfolio management systems. Caspian plans to offer a variety of such integrations, allowing clients to choose the individual components that are appropriate to their current workflow and to have Caspian connect to other systems as necessary.

Business Plan and Growth Strategy

Caspian is currently operational and connected to over ten exchanges. We expect to add up to forty exchanges to the ecosystem by the end of Q3 2018.

We plan to grow the business and roll out additional features and functionality over the following 12 months, as outlined below:

- Partnerships with existing exchanges to speed client acquisition and facilitate introduction to high volume traders.
- Customer outreach through service providers such as fund administrators. Caspian plans to connect with various service providers that work with new and existing asset managers evaluating the crypto space. We expect these relationships to be a major source of new clients looking for an institutional-grade trading platform.
- Build on the existing relationships of both Kenetic and Tora to identify and reach out to traditional asset managers looking to move into crypto asset classes, as well as existing crypto funds. Caspian is well placed to reach these groups at an early stage and drive their adoption of the platform.
- Expansion into crypto communities, including organizing trading competitions, setting up bounty programs and other community programs.
- Outreach aimed at developer communities, including organizing hackathons.
- Outreach to relevant industry bodies, including Financial Information eXchange (FIX) and the Alternative Investment Management Association (AIMA).
- Promotion of Caspian through events, trade shows, conferences and meet-ups.
- Online marketing strategy focused on institutional and experienced traders.

Provisional 12-Month Roadmap

The table below shows Caspian's expected development roadmap for the next 12 months. Initially, the team intends to focus on core functionality and exchange connectivity. Once these milestones are achieved, emphasis will be placed on implementing more complex functions and user interfaces. This roadmap is subject to change based on market conditions, token-based governance, legal/regulatory considerations and customer feedback.

Q2 2018	● 20 Supported Exchanges ● FIX API Access ● Basic Algos ● Basic SOR
Q3 2018	● SOR enhancements ● Algo enhancements ● 10-20 Additional exchanges
Q4 2018	● Pre-trade exchange-based TCA ● Limits: ○ identify overall market impact when using SOR ○ work across exchanges ● Latency: proximity to exchanges for algos ● Rebalancing ● Graphical reporting and visualizations ● REST API Access
Q1 2019	● xNew algos ● Liquidity Risk ● Value at Risk ● Stress Testing ● Sensitivity Shifts ● Margin: API Access

Token Ecosystem

Token Model Overview and Objectives

The Caspian token (CSP) is an ERC-20 compliant token to be issued on the Ethereum blockchain. The CSP token model has been designed to serve several principal objectives. In the broadest sense, the goal is to link Caspian's best-in-class functionality with a token that incentivizes platform use and the development of unique third-party tools and features. Specifically, the token is intended to create a rich, participatory ecosystem where platform users also become community members with an active interest in the platform. This is accomplished by giving the token user-to-platform utility (discount and governance) and user-to-user/developer utility. Broadly speaking, the token is not required to access the platform but can be used to enhance one's experience of it through an intentional variety of means and to get a variety of benefits. The hope is that users unfamiliar with token utility will be incentivized to take steps toward using the token in gradually more complex ways.

User-to-Platform Utility: The Commission Discount Programs (guaranteed and dynamic) and the Discount Payment Function will provide fundamental value to the token by allowing token holders to earn and potentially combine different discounts that can offset platform fees. . The Governance Node framework will also enable members of the token community to contribute to platform direction.

User-to-User Utility: The CSP rewards developers who offer their apps for free. Caspian will incentivize third-party development on the platform though grants, bounties, and a rewards engine. This will allow the (vetted) emergence of new features on the platform, complementing the base features with a richer and more attractive functionality.

Token provides utility but is not necessary: The token is designed to enhance the user experience and enrich the Caspian community. It is not designed to be necessary to enjoy the base feature set of the platform. Even without the token, clients can use all core features discussed in the preceding sections. That said, using the CSP token will open access to unique benefits that should be compelling to a wide range of users, and the multiple sources of utility allows different users to find value in the token in different ways.

Token "Staking": Many of the benefits for token holders will involve sending tokens to a staking contract. This is designed primarily as a means of accounting for the token balances of active users. Tokens sent to the contract cannot be used for transfer or trading. However, users will retain the ability to withdraw tokens from the staking smart contract at any time at their own discretion. As used in this section, the term 'staking' means sending tokens to the staking contract, from which token balances will be read. When a user stakes tokens in

the address, Caspian will track that user's total staking balance and the times at which that balance has changed. It will use that to ensure benefits are appropriately calculated as outlined below.

An individual staked token can only be allocated to one of the benefit mechanisms, though a user can stake different tokens for different benefits. For purposes of determining the Governance Council, all of a user's staked tokens are counted.

Commission Discount Function

The commission discount program has three forms. The first offers token stakers a guaranteed discount that increases in a predictable manner over time up to 25%, as long as the tokens remain staked. The second allows users paying in CSP tokens to receive an additional discount of up to 25% of their fees. .. The third is a potential dynamic discount, with further details to be published in due course..

In order to count towards a discount, tokens must have been staked for one week, counted as seven consecutive 24-hour periods, as of the daily calculation hour. Tokens begin to accrue benefits beginning on the eighth day after they have been staked. If the eighth day falls midweek, token holders will accrue a partial discount for that week, with a full discount applied to the following week, assuming the tokens remain staked. For purposes of the guaranteed discount, staked tokens designated towards the discounting benefits gain weight each week they are fully staked, up to a maximum of 25 weeks. At that point, staked tokens are considered to be at "full weight".

Guaranteed Discount

The guaranteed discount function establishes a mechanism where users can access a set discount that increases over time.

The discount accruing to tokens staked towards this option increases at the rate of one percentage point per week, up to a cap of 25%. The value of tokens staked must be greater than 1% of a client's weekly average of daily trade volumes in order to qualify. The staking threshold is established each week based on the previous week's trading and token price data. The user must maintain an average balance above this threshold in order to accrue another point of discount.

Establishing a minimum staking threshold based on a combination of an individual client's own notional trading volume and the fiat equivalent value of the token represents an effort to make the discount accessible to a range of clients, from moderate users to the most active. The system is also a flexible and responsive one, where clients will be able to adjust their staked token amounts relative to both their own activity on the platform and fluctuations in the token price.

To illustrate this, imagine a client with average daily trading volume of US$1 million throughout week 4 (assuming the client has already fulfilled all staking requirements up to week 4 and is currently at a 4% discount). During week 4, the CSP average token price was $0.50. For week 5 the same client would need to maintain a staked token balance of 20,000 tokens--the fiat equivalent of $10,000

in tokens or $1,000,000 x 1% at $.5 per token--in order to gain an additional discount point towards the 25% ceiling under the Guaranteed Discount program. If the client did maintain an average token balance of 20,000, the client would enjoy a 5% discount. Should week 5 close with the client's average staked token balance below the necessary threshold (for example, in a situation where the client's trading volume had increased during week 4, requiring an increase in staked tokens for week 5) the client would have a grace period of 72 hours to remedy the deficiency in order to continue to accumulate discount points during the new week.

A client who fails to top up a deficient staking minimum beyond the 72 hour grace period suffers no penalty and simply does not accrue an additional discount point for the new week. During a second week of unremedied deficiency, the client's discount is diminished by 1% relative to the prior week. In effect, the hypothetical client reverts to their week 3 discount level. A client that does not address a deficient token staking balance after the second week will see their staking discount reset to the initial 1% discount.

Caspian reserves the right to modify the staking threshold or temporarily suspend staking minimums in extreme circumstances, including in response to sudden market drops that raise effective token staking thresholds.

Discount Payment Function
Caspian will offer to users who pay fees in CSP a maximum 25% discount that stacks with other discounts.

A user who stakes tokens as part of the guaranteed discount and pays fees in CSP would receive a maximum 50% discount platform fees.

Dynamic Discount
Caspian intends to develop a dynamic discount program that has the potential to offer a greater discount to those staking tokens. Further details will be released in due course.

User to User Utility Accelerating Third-Party Development

The CSP token will play a critical role in incentivizing third-party development and integration on top of the Caspian platform. Possibilities include advanced charting libraries, user interface modifications, external trading signal feeds, or stress tests for trading strategies.

Third-party developers will have two options when offering an application or service on the platform:

- Selling usage of the app or service: In order to use an app or service, users pay a developer-determined subscription fee. Caspian will retain a portion of this subscription fee as platform host. In order to offer an app for sale, developers must stake* tokens as a deterrent against offering poor apps or service.

*This staking mechanism may be a different mechanism to the other staking described in this paper. Further details will be published in due course.

- Offering the app to token stakers: Instead of offering apps in exchange for subscription fees, developers can make them accessible to users who

stake tokens to use them. Developers who offer their apps in this way specify the monthly staking requirement and become eligible for tokens. Applications offered in this way are called 'free apps' because users aren't required to pay--only to stake tokens. Examples include third-party charting or fundamental analysis services with an access fee set at 10 staked tokens per month per user, or whatever amount the developer deems appropriate.

'Free Apps' to Token Stakers

In order to view the 'free apps,' users must stake at least one CSP. Beyond that, each app's token 'staking price' indicates its precise staking requirement. Users can only access as many 'free apps' as their total staking balance will support. If a user has ten total staked CSPs for purposes of applications, s/he can only activate a number of apps whose cumulative staking price is ten tokens. This is designed to discourage bloatware while still supporting open application development: users aren't spending tokens, but are rather determining where to allocate scarce resources. This should prevent the adoption of frivolous apps designed to be downloaded by many users. Tokens staked for app access are not eligible for a guaranteed or dynamic discount. This is a variation on the "freemium" model.

Ecosystem Development Incentives

From time to time, Caspian will consider providing rewards to application developers offering their apps to Caspian platform users. These rewards are based on a variety of factors at Caspian's discretion, but are premised on an app being provided for free or in return for a number of tokens specified by the developer to be staked. Of course, application developers always remain free to decide the fee or staking amount (if any) to access their app.

Whilst ultimately at an application developer's discretion, staking can provide a way for developers to test features and gauge interest, recognizing that a user is more likely to stake a token to use an app, since that token will eventually be returned, than to pay for it. Instead of spending a valuable asset, they are simply setting it aside while they use the app and providing 'payment' in the form of an opportunity cost.

The purpose of Caspian's discretionary rewards approach is to incentivize developers to consider allowing users to test their apps for free (or on a staked basis), rather than immediately requiring a fee from users. This can help users access innovative apps and test their quality, before deciding whether to pay for them (if and when they are offered on a paid basis).

This is a key element of Caspian's vision to build a true community of quality platform members, users, and developers. Further details will be released in due course.

Additional Development Bounties

Caspian's CSP token will play several additional roles in supporting third-party development:

- Development Bounties: A rewards mechanism slowly releases Caspian-held tokens into bounty pools to incentivize developers to build out key infrastructure, integration, and plug-ins. Distribution is determined by

Caspian in collaboration with the Governance Nodes. Caspian may choose to fund specific development integrations by establishing bounties for developers to target specific tools or functionalities.
- Community Bounties: Users will have the opportunity to vote for new features or apps they would like the see on the platform. Bounties for winning features or plug-ins maybe awardable.

Ultimately, the nature of the app-platform will depend heavily on Caspian's user base, and Caspian will be informed by its community council of top token stakers to help decide where to prioritize its resources. Caspian will allow users to vote on new features that have bounties attached. These are expected to spur development, with Caspian reserving the right to unilaterally establish bounties for use at the Company's discretion.

Governance Nodes

Caspian will implement a governance function that enables key members of the community to provide input on overall platform development.

The top 15 token stakers globally will serve as Governance Nodes and help guide the development of the platform. Tokens must have been staked for at least six weeks to be eligible for entry into this group. Membership is determined quarterly. Token stakers can choose to opt out of governance and transfer their status to the next staker.

This governing group functions as a council with which Caspian can regularly consult, particularly as it relates to Caspian's evolution into a platform for third-party development. The group will help define the bounty pools and participate in the allocation of development grants.

In exchange for their input, Governance Nodes receive an additional 5% discount on trading fees above that offered as a result of token staking.

Governance Nodes guide a minimum of 25% of Caspian's development resources for integration of new exchanges and new tokens, as well as the addition of new base-level features to be developed by the Caspian team. Each quarter, Caspian will consult with its current Governance Nodes to set priorities for the quarter. This ultimately will include milestones and development targets, which Caspian will communicate to these Nodes.

Caspian has the right to transfer governance activities on platform and potentially onto a blockchain.

Contact Caspian

To request further information, please use the following outreach channel:

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