

base EXCHANGE

**IT Architecture
Document**

Subject to regulatory approval

Version Log

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1.0	□	Collegiate Executive Board	Not applicable.

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1. Introduction

This document provides an overview of the architecture of the systems, infrastructure, monitoring activities, and administration of the environments that make up Base Exchange's Trading System.

Capitalized Terms used in this document that are not defined herein have the meaning assigned to them in the Glossary or, alternatively, refer to terms customarily used in the context of information technology and information security.

1.1. Scope

The architecture and procedures described were designed and implemented with the objective of covering all of Base Exchange's functional needs, automating and supporting its operation as an electronic trading environment for Assets in the Brazilian variable income market, within the highest standards of control, performance, and excellence, including reliable information security, *backup*, and infrastructure management processes.

The main Business processes covered by this architecture are:

- Offer Routing;
- Trading of Assets;
- Dissemination of data to the market (*Market Data*);
- Pre-trading risk control; and
- Control and storage of reference data.

The solution integrates via automated messaging interfaces and *straight-through processing* (STP) with:

- Trading Participants;
- Trading Service Providers;
- Distributors of *Market Data*;
- Investors;
- The Clearing and Settlement House operated by Base Clearing; and
- Other corporate systems.

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In addition, the solution provides screens for operating in the Trading System for the Trading Participants and for Base Exchange itself.

1.2. Document Organization

The Document is divided into the following chapters:

- **Functional Architecture:** describes the functional components of the solution that support Base Exchange's business processes, as well as their interactions and communication among components with external agents;
- **Capacity and Resilience:** presents the main capacity, performance, and resilience requirements of Base Exchange;
- **IT Infrastructure Architecture:** describes the organization of the equipment and environments that run Base Exchange's systems; and
- **IT Administration and Operations:** provides an overview of the tools and procedures that will be used by the IT Operations team for the monitoring and administration activities of the environments that support the Trading System.

2. Functional Architecture

This section describes the functional components of the solution that support Base Exchange's business processes, as well as their interactions and communication among components with external agents.

2.1. Overview

Base Exchange's Trading System was developed to provide Participants with maximum flexibility and simplified, harmonized messaging, using the most modern technologies to ensure high reliability, a significant increase in *throughput*, and lower, more predictable latencies.

The Trading System supports the following markets:

- Spot Market
- Spot equities;
- Units;
- Quotas of Market Index Investment Funds ("**Index Fund**" or "**ETF**"); and

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- Quotas of Real Estate Investment Funds ("FII").

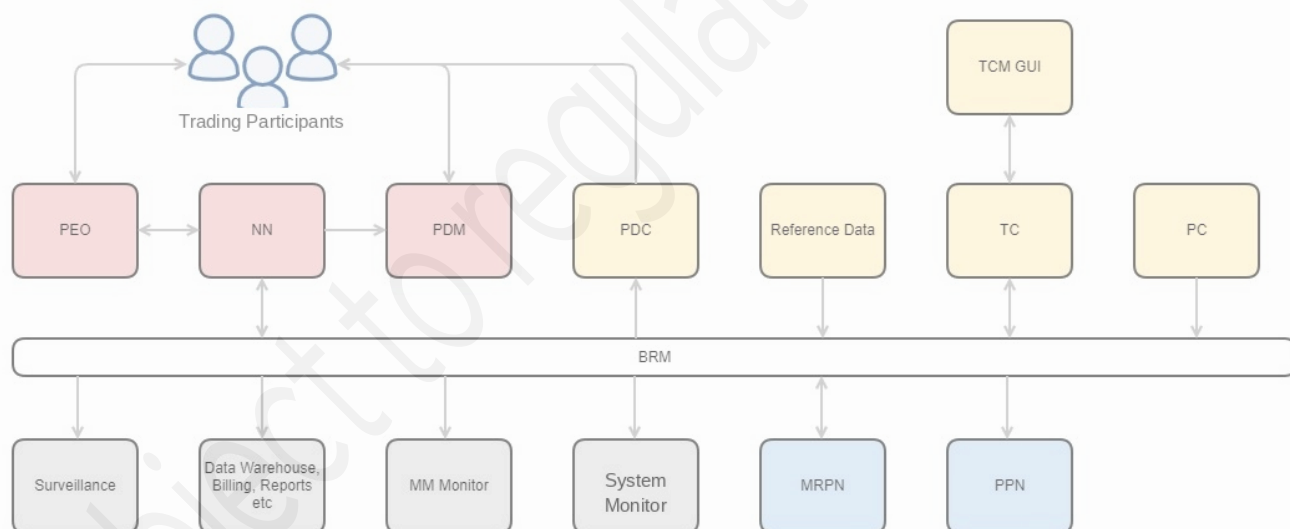
The Trading System supports a variety of segments, trading mechanisms, and Order types. The main trading modes supported are:

- Continuous trading of Assets in the Spot Market; and
- Buy-in trading of Assets in the Spot Market.

The Trading System is easily scalable through the creation of new trading cores on separate *hardware*, facilitating Base Exchange's growth process.

The system's interfaces use binary communication protocols that facilitate integration with Trading Participants, service providers, and *Market Data* distributors.

The figure below is a representation of the main functional components of Base Exchange's Trading System.



The table below shows the acronyms and terms used in the diagram above:

Area	Component
Trading Core	Pre-Trading Risk Monitor ("MRPN")

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Area	Component
	Trading Core ("NN")
	Order Entry Portal ("PEO")
	Market Data Provider ("PDM")
	Post-Trading Portal ("PPN")
	"Drop Copy" Portal ("PDC")
Market Management	Market Control Screen ("TCM GUI")
	Market Control Gateway ("TC")
	System Monitor
	MM Monitor or Market Maker Monitor (MM Mon)
Reference Data	Referential Data Management ("Reference Data")
	Resilient Message Bus ("BRM")
	Price Capture ("PC")

The following is a brief description of the main components of the Trading System:

2.1.1. Pre-Trading Risk Monitor (MRPN)

The MRPN is a pre-trading risk management tool that enables Trading Participants to limit their clients' risk exposure and monitor their transactions.

The MRPN also enables the management of investor/Account authorization to buy and/or sell Assets or groups of Assets, limiting Participants' total exposure, and suspending Accounts and investors.

2.1.2. Trading Core (NN)

The NN is the main component of Base Exchange's trading core, responsible for managing Offer books, performing the matching of Offers and generating Trades, and controlling the trading phases.

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The NN was developed with state-of-the-art technology to ensure high scalability, predictable latency, and flexibility to support various market models.

2.1.3. Order Entry Portal (PEO)

The PEO is the component that manages connections with Trading Participants for the submission of Offers to the NN. Through it, Trading Participants can submit and manage Offers using industry-standard protocols, such as FIX and Binary Protocol. The PEO was designed to facilitate market access.

2.1.4. Drop Copy Portal (PDC)

The PDC is a component that reads Ack messages (*Execution Reports*) and Trades from the persistence bus and performs simple transformations with data enrichment before sending them to Trading Participants and/or Clearing Members. *Drop Copy* messages are sent using the FIX protocol.

2.1.5. Market Data Provider (PDM)

The PDM is the component responsible for capturing, formatting, and distributing quotes, Trades, and market data. The PDM was designed to offer high-performance, flexible distribution.

2.1.6. Market Control Screen (TCM GUI)

The Market Control Screen connects to the Market Control Gateway and is the tool used by the Market Control team to monitor and manage, in real time, all aspects, activities, and information in the markets administered by Base Exchange.

With the TCM GUI, Broker Dealers can:

- Monitor the status and Reference Price of Assets;
- Manually suspend trading; and
- Request the resumption of trading following a manual suspension, provided that a Reference Price exists and the Asset is available for trading on the Listing Market.

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2.1.7. Referential Data Management (Reference Data)

This is Base Exchange's reference data management component, the official source of data for all of Base Exchange's systems, which provides interfaces for viewing, modifying, and managing the distribution of reference data.

The Reference Data enables the management of the following information:

- i. Assets;
- ii. Corporate Events;
- iii. Reference Prices;
- iv. Asset classes;
- v. Trading calendars and schedules;
- vi. Trading Participants; and
- vii. Floor Broker Dealers.

2.1.8. Post-Trading Portal (PPN)

The PPN is a customized component for managing post-trading interfaces with Base Clearing, which has its own screen that allows the management of *Trade* messages (received from the persistence bus) sent to Base Clearing's post-trading systems.

From this screen, Base Exchange is also able to view the status of Trades submitted to Base Clearing and, if necessary, resubmit them and carry out reconciliation procedures.

2.1.9. System Monitor

A tool used to monitor technical and business data, designed to enable advanced analysis and management of applications. For example, the System Monitor can be used to build monitoring dashboards and track the market in real time.

2.1.10. Market Maker Monitor (MM Mon)

This application monitors Market Makers' performance against their obligations, as follows:

- With respect to registration data: who the Market Makers are, which Assets they must operate in, and performance parameters (presence time, maximum *spread*, minimum offer size);

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- For the relevant Market Makers and Assets, throughout the Trading Session, MM Mon collects all events relating to the obligations;
- At the end of the day, statistics are calculated for the Trading Participant linked to the Market Maker and, for each relevant Asset, the compliance level relating to the obligations is computed; and
- The statistics are accumulated in the database so that daily/weekly/monthly/bimonthly compliance levels can be computed.

Reports are automatically generated based on these statistics. These reports enable Base Exchange to assess whether the Market Maker has fulfilled its obligations during the contracted evaluation period.

2.2. Communication Among Components

The trading components (Pre-Trading Risk Monitor, Order Entry Portal, Trading Core, and Market Data Provider) communicate directly using a proprietary protocol. Communication between the trading components and all other components, in turn, is carried out through the Resilient Message Bus for data persistence and sharing.

2.3. Communication with External Agents

The main interfaces between Base Exchange and external agents are listed below.

Agent	Format	Context	Specification
Trading Participant and DMA Provider	FIX	Submission of Orders and Drop Copy	PEO specifications - FIX interface
	Binary	Submission of Orders	PEO client specifications - Binary interface
Distributors of Market Data and Regulators	Binary	Dissemination of Market Data	MDF Client Specifications
Base Clearing	FIX		Base Exchange FIX Specification

2.4. Reference Data

The main information used as Reference Data by Base Exchange's systems is detailed below, along with the sources used to capture such information.

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Information	Description	Source
List of instruments accepted for trading	This is the list detailing the variable income instruments accepted for trading on Base Exchange	Base Clearing
Reference Price for variable income Assets	Update of the opening and closing prices of Assets tradable on Base Exchange	Market Data B3
Corporate Events	List of Corporate Events affecting Assets admitted to trading on Base Exchange	B3 Depository
Trading Participants accepted by Base Clearing	List of Trading Participants authorized at Base Clearing	Base Clearing
Active Position Accounts at Base Clearing	List of active position accounts at Base Clearing	Base Clearing

3. Capacity

The main capacity metrics relating to the core of Base Exchange's Trading System are listed below.

Metric	Capacity
Number of Offers	20 million offers per day
Trades per Day	1 million trades per day
Maximum number of simultaneously connected Participants	150
Maximum number of Accounts	1 million
Maximum number of instruments	500

4. IT Infrastructure Architecture

4.1. Overview

Base Exchange's technology infrastructure architecture was designed to allocate workloads according to their specific performance and latency requirements. Accordingly, all services classified as critical and requiring low latency run in the *data centers* of Equinix and Ascenty, environments that offer consistent performance, enhanced operational control, and high local availability. The infrastructure of these *data*

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centers is optimized to support response-time-sensitive operations, contributing significantly to the reduction of operational risks related to performance.

Services that do not depend on low latency, as well as running applications that benefit from elasticity, scalability, and on-demand capacity, will be maintained in the cloud computing environment.

The integration between the *on-premises* environment and the cloud infrastructure will be established through secure, redundant connections, ensuring efficient and resilient communication between the environments. In addition, continuous monitoring and control mechanisms will ensure operational visibility, consistent performance, and full coordination between local and cloud resources.

Lastly, the Rio de Janeiro office will house the teams responsible for the operations center and support of the production environment, ensuring governance, monitoring, and rapid incident response.

4.2. Data Centers

The *on-premises* environment will operate in two geographically distributed *data centers*, ensuring operational resilience and continuity of services even in scenarios of localized unavailability. The infrastructure will be composed of dedicated cages, designed to fully meet the institution's technological needs. These cages have exclusive access controls, biometrics, physical keys, and CCTV monitoring, ensuring enhanced physical protection of the environment.

4.3. Cabling Equidistance

Another essential point of the architecture is cabling equidistance (*cable length parity*) among Participants, in order to ensure a level playing field in access to the trading systems and to market data distribution.

To this end, all physical links, in the *cross-connect* modality, will be provisioned with equivalent lengths, regardless of the physical position of the rack in the data center, using standardized, pre-defined cabling routes. Any physical differences will be compensated for through controlled adjustments in cable length, eliminating any advantage arising from a shorter propagation distance.

The implementation must be documented and auditable, including periodic measurements and validations, in order to ensure ongoing compliance with deterministic latency requirements and equal treatment among participants.

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4.4. Clock Synchronization

Time synchronization will be based on the PTP (*Precision Time Protocol*) protocol, in compliance with IEEE 1588, ensuring accuracy through *hardware timestamping*.

The architecture will use redundant GNSS receivers, responsible for the time reference traceable to UTC, and servers configured as PTP *Grandmasters*, which will distribute time throughout the network *backbone* with support for *boundary* and *transparent clocks*.

Order and market data messaging will be synchronized directly by the *Grandmasters*, ensuring temporal consistency throughout the environment.

Synchronization will enable the generation of precise *timestamps*, the measurement of end-to-end latency, and the auditable reconstruction of the sequence of events.

4.5. Cloud Environment

The cloud computing environment was designed to ensure high availability, operational resilience, and business continuity. The infrastructure will be distributed across the three availability zones available in Brazil, ensuring fault tolerance through physical, power, and network isolation between zones. This strategy allows services to continue operating even in the event of localized disruptions in any one of the zones.

In addition, the environment will feature synchronous replication between availability zones, ensuring that data is written simultaneously to multiple locations, preserving the consistency and integrity of information in real time.

This will result in a robust, scalable cloud architecture aligned with resilience best practices, supporting critical operations with stable performance and advanced protection against outages.

4.6. Management Office

The management office will be responsible for the operations center and support of the production environment. The site will have its own Data Processing Center ("CPD"), equipped with *UPS units* in parallel, ensuring redundancy and greater autonomy capacity, in addition to its own generator to maintain operations during prolonged outages. Connectivity will be redundant, provided by different carriers with independent physical routes, ensuring high availability and continuity of critical services.

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4.7. Servers

The servers dedicated to the *Matching Engine* constitute the critical core of the trading infrastructure, designed to operate with maximum performance, low latency, and deterministic behavior.

These servers will be provisioned in a dedicated (*bare metal*) environment, with no resource sharing, ensuring total isolation of CPU, memory, network, and storage. The hardware configuration will be optimized for high-frequency processing, including high-performance CPUs, low-latency memory, and network interfaces supporting *kernel bypass* and *hardware timestamping*.

The environment will be tuned to minimize variability (*jitter*) through operating system optimizations, CPU affinity (*CPU pinning*), disabling of unnecessary interrupts, and elimination of virtualization layers. Additionally, the *Matching Engine* will operate close to the order entry points (*order gateways*), reducing network latency and ensuring efficient processing.

The architecture includes local contingency mechanisms within the same *data center*, combined with geographic redundancy between distinct data centers, ensuring high availability, operational continuity, and rapid switchover in the event of failures (*failover*).

All processed events will be recorded with high-precision *timestamps*, duly synchronized to the environment's time reference, ensuring traceability, consistency, and integrity in the chronological ordering of transactions.

4.8. Data Replication

Data replication will be carried out through the Resilient Message Bus ("BRM"), ensuring the consistency, integrity, and high availability of information among the different configured *clusters*. This architecture will support both local contingency within the same *data center* and replication to the secondary site, ensuring operational resilience and continuity of services in failure scenarios.

4.9. Storage and Persistence

Base Exchange's systems use databases for different applications and purposes. The storage, persistence, and data replication mechanisms of Base Exchange are described below.

4.9.1. Resilient Message Bus (BRM)

The BRM consists of a persistent message bus, that is, a *publish-subscribe*-type messaging platform based on a distributed *commit log*.

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The BRM's main features are:

- i. Scalable, persistent message bus;
- ii. Access through a publish-and-subscribe API; and
- iii. Configurable retention duration and resilience.

4.9.2. Operational Database

A relational database will be used to store static, reference, and transactional data in normalized form, which is used by the *software* for all of Base Exchange's operational activities and processes.

The relational database is used by Base Exchange's applications to record and query Operational Data, and may not be accessed for complex data queries or the generation of historical reports.

4.9.3. Data Warehouse

Base Exchange's *Data Warehouse* uses the relational database and is updated through ETL (*Extract-Transform-Load*) routines with denormalized data, optimized for reading and report generation.

This database is used to generate reports and query historical data and must not be used to record intraday, mutable operational data, or data used routinely by applications to execute operational processes.

4.10. Connectivity and Interconnections

Base Exchange's connectivity and interconnection architecture was designed to ensure high availability, low latency, operational resilience, and secure communication among all components of the technology environment, spanning *data centers*, cloud, and the corporate office.

The interconnection between the *on-premises* environments, hosted at the Equinix and Ascenty *data centers*, and the cloud infrastructure is carried out through dedicated, redundant channels distributed across distinct physical routes, ensuring operational continuity even in the event of carrier, link, or equipment failures. This connectivity model enables efficient, stable communication between critical applications, in addition to supporting synchronous replications, data synchronization, and latency-sensitive traffic flows.

In an integrated manner, the connectivity architecture adopts the following fundamental principles:

- Redundancy: multiple links and carriers, with distinct paths.
- Low Latency: optimized connections between *data centers* and the cloud for critical *workloads*.
- Security: private interconnections, end-to-end encryption, and network segmentation.

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- Resilience: fault tolerance at the network layer, telecommunications carrier circuits, and transport.
- Scalability: capacity for bandwidth expansion and new points of presence as demand requires.
- Centralized Management: integrated operation via the Operations Center, with continuous monitoring and traffic observability.

With respect to the modes of access to Base Exchange's technology infrastructure, Participants may establish connectivity to the systems through different technological solutions, to be selected in accordance with the guidelines, technical requirements, and operational criteria established in the Connectivity Manual.

The available access modes comprise:

- i. Cross Connect
- ii. *Fabric*
- iii. Leases Lines
- iv. VPN Site to Site (*Unicast* and *Multicast*)
- v. RTM – Telecommunications Network for the Market

4.11. Monitoring, Logs, and Observability

Base Exchange maintains a robust monitoring, log collection, and observability structure to ensure operational continuity, incident detection, and compliance with regulatory requirements, in line with regulatory guidelines relating to operational resilience and information security.

Monitoring operates 24x7, covering the availability, performance, and capacity of critical services, with automatic alerts and centralized *dashboards* for rapid failure identification. Observability must integrate metrics, *logs*, and traces, enabling in-depth analysis and root-cause identification of incidents.

The management of *logs* must ensure centralized collection, retention appropriate to criticality, protection against alteration, encryption in transit and at rest, and access controls based on the principle of least privilege. Enhanced protection includes the use of immutable logs when necessary.

All relevant events must be integrated into the security ecosystem (SIEM/SOC) for correlation and threat detection, supporting cybersecurity practices.

Lastly, regular audits, periodic reports, and integrity tests ensure the reliability of the environment and support compliance with the regulatory requirements applicable to financial market systems infrastructure.

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4.12. Backup, Restoration, and Data Protection

The *backup* strategy will be structured to meet business continuity and operational resilience requirements, including *full* and incremental *backup* routines for critical data and systems. This data will be stored in segregated, secure environments with strict access controls, ensuring protection against technical failures, infrastructure unavailability, and cyber events.

The adopted model will enable efficient recovery and limitation of data loss, aligned with the continuity practices required by applicable standards, with clearly defined recovery objectives (*Recovery Time Objective* – RTO and *Recovery Point Objective* – RPO). Periodic restoration tests will be carried out to validate the effectiveness of the procedures and ensure recovery within the timeframes established in the business continuity plans.

Additionally, the backup solution will be integrated with the Incident Response Plan and with the information security structures, ensuring adherence to governance guidelines, internal controls, and risk management.

The data retention, storage, and disposal policy will comply with applicable regulatory requirements. In this context, operational records, trading data, system *logs*, and audit trails will be kept for the regulatory periods, ensuring their integrity, immutability, availability, and recoverability for purposes of supervision, audit, and compliance investigations.

Data protection processes will incorporate advanced mechanisms, such as encryption at rest and in transit, access controls based on the principle of *least privilege*, continuous integrity validation, and the use of immutability technologies (*immutable storage*). These measures aim to ensure the reliability, preservation, and traceability of critical information, reinforcing the resilience of the infrastructure against adverse scenarios and ensuring regulatory compliance.

4.13. Environment Segregation

The IT architecture will be structured into segregated environments, with the objective of ensuring operational isolation, change control, and quality of the development and deployment processes. The existing environments comprise:

Production: an environment intended for running systems in an operational regime, supporting order processing, trading, and other critical functions. This environment has strict requirements for availability, performance, security, and access control, and is subject to formal change management processes and continuous monitoring.

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Certification (Homologation): an environment used for integration testing, functional certification, and compliance validation by Participants and internal areas. This environment replicates, to the extent possible, the conditions of the production environment, allowing for the validation of functionalities, operational flows, and technical requirements prior to entering production.

Development: an environment intended for the construction, maintenance, and evolution of the systems. Development activities, unit testing, and technical adjustments are carried out here, with no direct impact on production environments. This environment has greater operational flexibility, but remains subject to version control and software engineering best practices.

The segregation between environments ensures the integrity of the production environment, reduces operational risks, and ensures adherence to governance, internal control, and change management best practices.

5. Administration and Operations

This section provides an overview of the tools and procedures that will be used by the information technology operations team (“**IT Operations**”) for the purpose of managing the trading environments of the markets administered by Base Exchange.

5.1. Operating Hours

The Trading Session will be open every Business Day, following the Schedule for each market segment set forth in the Trading Operating Procedures Manual, and, when updated, will be disclosed to the market in advance on the Base Website and through a Circular Communication.

Applications will be available before and after the Trading Session for start-of-day and end-of-day routines. Start-of-day and end-of-day routines depend primarily on the receipt of reference data.

A time interval between the start-of-day routine and the start of the Trading Session will be provided to allow a safety margin, ensuring that potential incidents can be addressed and resolved before trading begins.

Start-of-day routines are expected to begin up to 3 (three) hours before the start of the Trading Session, and end-of-day routines are expected to be completed up to 3 (three) hours after the close of the Trading Session.

5.2. Market Administration

Market Operations Management will be carried out through the following systems:

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- i. PEO, NN, and PDM control screens;
- ii. Static Market Data GUI (including MM MON GUI); and
- iii. TC Admin GUI.

5.3. Application Management

5.3.1. Application Management Tools

All application configuration and technical management will be carried out through 1 (one) application:

- i. **System Monitor:** a framework that allows the IT and Operations teams to monitor and control performance indicators (*throughputs*, latencies, volumes, resource utilization, limits, etc.) of all components.

5.3.2. Daily Monitoring and Control

Monitoring and oversight of applications is carried out by the IT Operations team to ensure that systems are always in good operating condition. In particular, this team is responsible for the following actions:

- i. Monitoring and checking system *hardware* (CPU, disks, communication controllers, ports, other *hardware*), components, and *software* services, network paths, file systems, and databases;
- ii. Detection of any system problem for which the IT Operations team must be notified;
- iii. Execution of routines and tasks necessary to perform system health checks when requested by Base Exchange's market control team ("**Market Control**") during the trading cycle;
- iv. Real-time monitoring of the technical status of the systems; and
- v. Archiving of technical system data for analysis and capacity planning.

5.3.3. Start-of-Day and End-of-Day Procedures

Start-of-day and end-of-day routines are managed entirely by the System Monitor through the execution of *Batches*.

A "**Batch**" is understood to mean a set of steps defined by automated commands that are executed in sequence. In this regard, it should be noted that each step must be completed successfully before the next step is executed.

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6. General Provisions

This document was approved by Base Exchange's Collegiate Executive Board and is in effect as of the date of its approval.

The proprietary area responsible for supporting the preparation and review of this document is the Information Technology Area. This document will be reviewed at least annually and may be amended at any time by resolution of Base Exchange's Collegiate Executive Board. This document and any amendments thereto will be disclosed on the Base Website, in clear, accessible language and in accordance with the applicable legislation and regulations

Omitted cases and questions of interpretation relating to this document will be addressed by the Collegiate Executive Board, in accordance with applicable law and the Base Rules.

Should any provision of this document be deemed invalid, illegal, or ineffective, that provision will be limited to the extent possible so that the validity, legality, and effectiveness of the remaining provisions of this document are not affected or impaired.

In the event of a conflict between the provisions of this document and Base Exchange's other rules, the more specific rule shall prevail, considering the subject matter in conflict. In the event of a conflict between the provisions of this document and Base Exchange's Bylaws, the Bylaws shall prevail. In the event of a conflict between the provisions of this document and applicable legislation and regulations, the applicable legislation and regulations shall prevail.

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