XP ELETRONIC TRADING SERVICES

PutCallBot ATS

Compliance Document for Routing Client Orders

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This document contains a general description of the PutCallBot automated trade system and is intended to assist in organizing and fulfilling XP ETS compliance requirements.

Contents

Important Note

In order to help checking if the compliance requirements were achieved, it is recommended to first read the "Compliance Requirements Checklist" on page 14.

System Description

PutCallBot is a software solution that evaluates quantitative analysis from real time Bovespa exchange market data, sending buy and sell signals to broker according to the algorithmic strategy chosen by the trader.

Our automated trading system is a very powerful web platform that allows our clients work from any web browser or device.

This system is designed to negotiate stocks or options in a low frequency trading way and manages day trade or swing trade positions as well.

There are a several presets strategies for any market scenario.

The trader can configure these strategies following what he feels more profitable.

Each bunch of configuration makes an individual automated trade system or a robot.

On the web interface, the trader can watch the transactions that were made by the robot he has developed.

At the end of the day, an e-mail is sent to trader reporting the profit or loss of a robot.

It is also possible send manual orders and let the robot manage them.

The trader can work with virtual orders or set to route them to his broker. One or more broker accounts can be saved and used.

All changes made in the strategies parameters are logged and can be viewed in an audit report by the trader.

Each algorithm step that is analyzed by the robot is logged. It helps in trailing what were the circumstances involved in the decision of doing or not a specific action or transaction.

Our platform allows the trader to create, debug, test, optimize, and execute trading robots in an exclusive environment totally independent from the production server. The user can request a development server to safely build and test their algorithmics. When the work is done, all these strategies can be published to production in the real world environment.

The backtest environment reproduces the real world condition because all ticks captured in production and used by the robot are saved and exported to the backtest server in the same order that happened.

The trader can follow his robot working on production and then compare in the backtest if the transactions are done at the moment it is expected. There is a validation process that is daily executed. It checks if the backtest evaluates to the same result presented at the end of day by the robot.

The main purpose of PutCallBot is to replace the hard work of following the market tick by tick giving time to the trader evaluate better strategies for his portfolio.

In order to keep our systems working with a reasonable performance, public joining is closed to new users. Eventually an invitation e-mail is sent to someone registered in our waiting list. A new user must be indicated by an already registered member. This reserved membership allows us a better control of who is intended to trade with our platform.

Our users must have an advanced trading profile that can deal with potential losses. Those who have limited amount of money to invest should probably avoid our automated trading strategies.

What concerns us here is that this amount of money is central to the proper capitalization of a trading account. Proper capitalization means that an account is funded with sufficient capital to absorb the maximum risk, or drawdown, that the trading strategy may endure. More important, not only can it absorb this drawdown, the account must have sufficient capital remaining after drawdown to continue to trade with the strategy. If your drawdown wipes out your trading account, you will not be able to continue trading recoup your losses and move on to a new high from the many wins to come. As they say at the gaming tables, "If you can't pay, you can't play".

System Development

PutCallBot has been developed for running on Windows Microsoft platform.

It is a multi-client server solution.

The web client interface uses HTML5 standard and the dynamic content is written in javascript language code. So, javascript and cache features must be enabled on browser to get our system properly working.

In the server side, the application is written in C# language, uses the .NET Framework 4.5 resources and is hosted in IIS 8.5 web server.

All code produced is protected under Subversion software versioning and revision control system. This solution allows our team to trail all line of code helping the development auditing and the software quality enhancement.

For user record and transaction data persistence, SQL Server 2014 database solution is used.

By the way, tickers, logs, audit trails, FIX communication logs are stored in plain text files.

The most system configurations, like user strategies, are stored in XML format, helping integration and readability.

System Environment

PutCallBot platform is placed in the Amazon Cloud network.

For our convenience our servers are distributed in 3 datacenters located in different regions.

We have taken this decision in order to reduce our maintenance cost without degrading overall system performance.

The server network infrastructure has the follow setting:

- SÃO PAULO Datacenter
  - FIX SERVER SP
    - market data listener server
  - FIX SERVER RJ
    - failover market data listener server
  - XP VPN SERVER
    - dedicated server for VPN tunneling to XP routing server
  - PROD SERVER
    - production environment for the application web server
    - database storage
    - order routing service interface [FIX router]
- OREGON Datacenter
  - APOIO SERVER
    - a back office server support
    - manages our VPN
    - has the Amazon cloud service management integrated to our platform
    - executes maintenance tasks like backup, server load/unload, schedule procedures, monitoring service status
    - provides a webservice interface for following up these maintenance tasks
    - order transactions and strategies updates are mirrored on a database in order to fast recover production server failure
    - manages our software version control system
  - BACKTEST SERVERS
    - a dedicated server for strategy backtesting purposes
    - it is loaded on demand by user request
  - STAGING SERVER

        - a server used for checking if an application new version is stable enough to be published to production
- NORTH VIRGINIA Datacenter
    - BACKTEST SERVERS
        - a dedicated server for strategy backtesting purposes
        - it is loaded on demand by user request
        - when the Oregon datacenter is overloaded or full, we redirect backtest requests to North Virginia cloud

Important Notes

All servers are running Windows Server 2012 R2, except APOIO server that is running Windows Server 2008 R2 and XP VPN server that is running Linux.

The APOIO server has a mirror database that receives all transactions generated by production server.

Every day at late night a maintenance routine is started.

It does a backup task using a cloud feature that makes an image copy from the servers FIX SERVER SP, FIX SERVER RJ, PROD SERVER and APOIO SERVER.

So, if a server crashes, we can recover it from a yesterday position and runs a procedure to get the transactions that were lost from the APOIO support server.

The maintenance routine also copies to backtest server all changes made in production server, including new tickers, strategy or user updates.

This procedure ensures that all backtests are done very close to the real world.

In the PROD server a SQL Server database backup is done and a windows server image is generated too. This image is saved in a Google drive account. In a remote hypothesis of losing Amazon access, we can recover the system in a new server running it on a different infrastructure. Even working in a cloud environment, using virtual servers, we can secure that our sensitive data is protected in the worse scenario.

In order to keep our costs as lowest as possible, our servers are launched only when they are necessary.

The FIX and PROD servers are launched in workday at 08:00AM and are shutdown at 19:00. This schedule covers the Bovespa market opening hours.

The XP VPN and APOIO servers work everyday and every hour.

The STAGING and BACKTEST servers are launched by user request.

The APOIO server manages our VPN.

All servers and client machines must be authenticated in our network in order to connect or consume a resource from our environment.

All servers have the Windows Firewall enabled and is configured to block ports for unknown machines requests.

We also use the Amazon Firewall as another layer of protection. Only HTTP port is opened in the PROD server to not authenticated internet connections.

System Security

PASSWORD RULES

The user password is stored in our database in a cryptographically protected form that does not permit to read it back.

Only the user knows the password for access his account. If this password is forgotten, the user should request a new provisory password in the login page. In this request form, user must fill in his login and CPF [Brazilian identity number] fields. After submitting this information, a confirmation request will be sent to him by e-mail. On his first returning access, the system will request him to change this password to a new one.

Weak passwords are not allowed.

The password must have at least six characters. It cannot contain repeated characters. It should use at least three of these four types of characters: Upper case, Lower case, Number, Special (@#$%...).

The password expires after 45 days. The system starts warning the user to change it five days before expiration.

The user should not repeat an old password. The last six passwords are kept to avoid it.

If user mistakes his password for more than five consecutive attempts, the account will be blocked. The user should request a new password or contact us to release it.

It is not permitted to have more than one current open session by user. If the user enters the system using a different browser or device, the previous session will be automatically closed.

USER ACCESS RULES

Each user must be granted privileges for a system resource or functionality.

These rules are described below:

- **Administrador** [Administrator]
  - This is the top level of permission that allows the user to change configuration settings of other users.
  - This type of user can access all system reports like transactions, positions, strategies, logs and audit trails.
  - This user can see other user information but cannot act or send requests in the name of another one.
  - This user is not able by default to send routed orders. The routing rule must be set in the administrator account to enable routing.
- **Roteamento** [Routing]
  - This rule allows the user send routed orders.
  - The user can still work with virtual orders.
  - This rule must be set in order to let a user robot work with real orders.
- **Venda Descoberta** [Naked Shorting]
  - This allows the user to sell an asset without first borrowing the security.
  - If this rule is disabled, before a selling trade, the system checks if the asset sold is in the user custody account.
- **Envio Ordem** [Position]
  - This allows the user to send any type of orders, real or virtual.
  - Without this rule granted, the user can only see his account information but he can still uses our backtest environment.
- **Automação** [Automation]
  - This enables a robot to work in the name of the user, playing the same role as its owner.
- **Seguidor** [Follower]
  - This allows a user robot to follow a robot of another user owner.
  - With this rule enabled, the user can look a financial result report from a robot of a different user and requests to follow all transactions done by this robot.
- **Auditor** [Audit]
  - This allows the user to open all log and audit reports.
- **Convidado** [Guest]
  - The user is limited to use the backtest environment for testing and optimizing his strategies.

Important Notes

Only the administrator can change user permission.

The user can only see his enabled rules on the user account window.

The robot plays the same role as its owner user does. So, all user rules are also granted to the robot privileges.

System Main Menu

This section describes the main menu items of the web interface client.

- Cotações [Quotes]
  - User can choose BOVESPA tickers to follow up.
  - It is shown a ticker online data as last trade, open, high, low, close prices.
  - Best buy/sell offer is also shown.
  - It is possible to open the buy/sell order request window.
- Candles
  - Candle bar graph [*under construction*]
- Ordens [Transactions]
  - All user transaction orders report.
  - It is possible to filter only the routed orders.
  - Grouping is another important function to show valuable information about financial returns.
  - It is possible to build many different views by choosing columns and filtering.
- Contratos [Custody]
  - Online custody report.
  - It is our Main system report.
  - The strategies are grouped and its results are shown online.
  - It is possible to open the buy/sell order request window.
  - User should manager all strategies attributes, information, performance, results, logs using this report.
  - This report is also used for backtest request and analysis.
- Carteiras [Strategy]
  - Strategy Maintenance
  - Strategy Attributes Change Log
  - Financial reports [*under construction*]
- Opções [Stock Options]
  - A report specialized in stock options [*under construction, current available only for PETR4, VALE5 options*]
  - It is possible to get or build a specific group of option strategies using online quotes [*under construction, automated sending orders is still not implemented for this functionality*]
- Notificações [Notifications]
  - All system notifications sent to user client are opened in an alert window and stored in this small report.

- Dicas [Tips]
  - Technical analysis tips [*under construction*]
- Status
  - System Status report of all important servers and connections.
  - Our system monitors and warns if troubles happen with the broker communication.
  - If a server is down or a connection is lost, the user is warned.
  - The 3 market data FIX connections and its failover are monitored.
  - The routing FIX connection is monitored too.
  - If there is a delay in connection, system warns user and automatically switches to the failover connection.
- Sistema [System]
  - Maintenance tasks and reports.
- Relatório [Report]
  - Statistics reports.
  - Backtest analysis.
- Mercado [Market]
  - Important online information about market.
  - Economic Calendar
  - Earnings Calendar
  - Currency and Commodities Quotes
  - Indices
- Auditoria [Audit]
  - Audit reports

System Failure Contingence Plan

This section lists the potential failure scenarios and describes suggestion for mitigation.

- FIX Market data connection lost
  - The system monitors the two market data channels for performance speed and availability. If a link is slow or hangs, the system automatically switches between them.
  - If the two channels are down, an alert is shown for administrator user to provide a solution internally or calling XP network support.
  - If no solution could be found, the system will block new routed orders. The support team would call users that have an opened position and let them close it directly to broker.
- FIX Routing order service connection lost
  - The system monitors the routing connection.
  - If it is down, an alert is shown for administrator user to provide a solution internally or calling XP network support.
  - If no solution could be found, the system will block new routed orders. The support team would call users that have an opened position and let them close it directly to broker.
- SQL Database failure
  - Recover the last backup in the production server and then load all missed transactions from the APOIO server support.
  - The support team would call users that have an opened position and let them close it directly to broker.
- Production Server failure
  - Launch another server instance in the Amazon cloud from the last image saved.
  - Load all missed transactions from the APOIO server support.
  - Reload tickers from FIX SERVER SP the current day files.
  - The support team would call users that have an opened position and let them close it directly to broker.
- Amazon Cloud unavailable
  - Create a new production server in the IBM Softlayer datacenter from the last saved windows server image located at Google drive cloud.
  - Call XP network support to set a new VPN configuration.
  - The support team would call users that have an opened position and let them close it directly to broker.

Compliance Requirements Checklist

In this document section all compliance requirements will be approached and better detailed.

1. Password Security
    a. Password restrictions are described in this document in the section "System Security". Turn to page 8.
    b. These images evidences are shown at the page 17.
    c. Encrypted Password Table Field, page 29.
    d. Password change interface tests page 17.
    e. Changing password to a low complexity one, page 18.
    f. Confirm changing password with a different current password, page 18.
    g. Already used password error, page 19.
    h. Request new password form, page 19.
    i. Change password request e-mail, page 21.
    j. Login form, page 21.
    k. Provisory password change request, page 22.
    l. Double Authentication Disconnect, page 23.
    m. Password wrong try message, page 24.
    n. After 5 tries blocked account, page 24
    o. Unblock Account dialog box from Administrator view, page 25
2. List of Users
    a. This report is located at "Lista de Usuários" [Users List] link in "Auditoria" [Audit] menu. See it at pages 17 and 27.
    b. The report is shown at page 26.
    c. SQL Table and Query Script at page 28.
3. Environment Segregation Evidence
    a. Environment Segregation is detailed in the section "System Environment". Turn to page 5.
    b. Evidence is shown at page 31.
4. FIX Orders Audit Log
    a. All routed orders are shown in the user Order transactions report.
    b. It is also possible to query the FIX file log that records all PutCallBot transactions passed through FIX protocol to XP broker OMS.
    c. Fix file log, page 38
5. Historical Data Report
    a. The system logs are registered in text files.

b. In order to help querying these files, there are some audit reports in the web interface that shows these log data
c. These reports links are placed in the “auditoria” [audit] main menu item.
d. It can be check it out at page 27.

6. Production Server IP and MAC Address
   a. The production public IP is **54.207.84.238**.
   b. Its MAC is **02-C0-BE-C1-8B-E9.**
   c. Turn to page 33 to 34.
7. Final Client List
   a. The report located at audit menu link “Limite Diário de Negociação por Usuário” shows the current limit and what it is being used by user. Turn to page 37.
   b. The system only operates with BOVESPA stocks and related options contracts.
   c. Users are not allowed to negotiate other market than BOVESPA.
   d. At this moment, BMF negotiation is forbidden.
8. User Access Log Audit Trail
   a. The user access is logged in text files.
   b. Open “Log de Acesso ao Sistema” audit menu item to open a report that queries these files. Turn to page 35.
   c. It is not possible to get the client MAC Address because the user browser doesn’t send it to us by our http requests.
9. Administrative Changes Audit Trail on the Admin user
   a. All user changes are stored in a log text file.
   b. This file records the user id and the type of change was done in the system configuration.
   c. This file contains changes done by all type of users, administrator or not.
   d. Open it at “Log de Atualização dos Dados do Sistema” link located in the audit menu. Turn to page 36.
10. Administrative Changes Audit Trail on the risk/limit
    a. These changes can be checked it out at “Log de Atualização dos Dados do Sistema” link located in the audit menu. Turn to page 36.
    b. Only the client user can change the account limit.
    c. The report located at audit menu link “Limite Diário de Negociação por Usuário” shows the current limit and what it is being used by user. Turn to page 37.
11. Contingence Plan
    a. Described in “System Failure Contingence Plan” section. Turn to page 11.
12. Client Profile

a. Our users are independent traders.
b. They manage their own assets.
c. They must have an advanced trading profile that can deal with potential losses.
d. The system is suitable for a private restricted group.
e. A new client must be indicated by a registered user.

13. System Backup Solution

a. The database backup is done daily in production server
b. The server image backup is done daily in the Amazon cloud

14. Stored Data Age

a. The backups started to be indefinitely stored on March 28.