QuestradeReconcile Python Script

QuestradeReconcile © 2019 - 2021 kerouac01850

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1 Introduction

The QuestradeReconcile macro is python code that uses the Questrade application programming interface (API) to fetch account, position, balance, equity, 30 day activity, and dividend data into a LibreOffice spreadsheet file. This script is meant to be run infrequently to help provide a dashboard view when, for example, re-balancing a portfolio. It is not meant to track real time market conditions and will raise an error when invoked too frequently.

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1.1 Reconcile a Spreadsheet with Questrade

Open the Sample spreadsheet and press the *[Reconcile]* button. Inspect the newly updated values in the Accounts, Balances, Positions, Equities, Activities, and Dividends sheets.
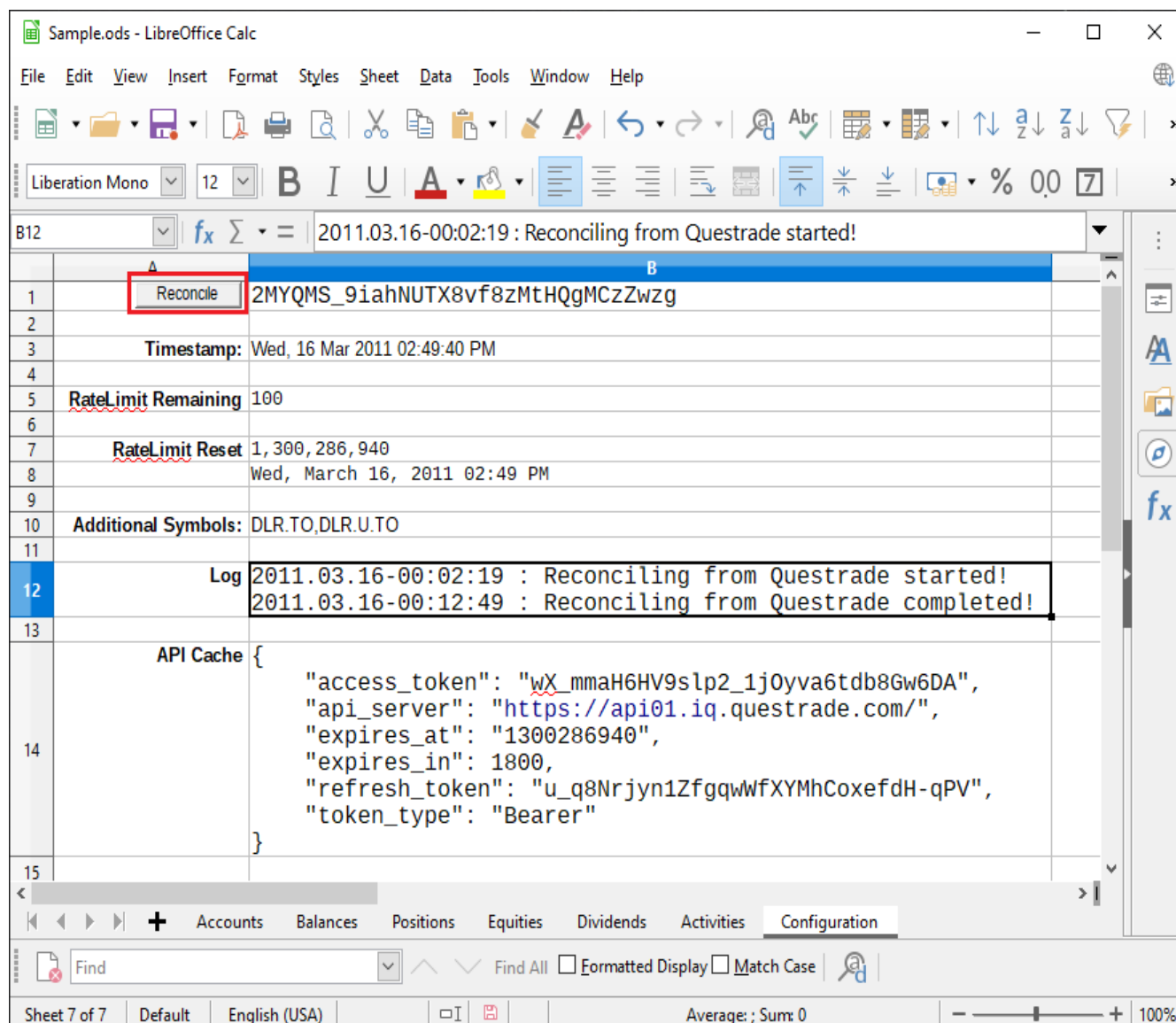

Figure 1: Run the QuestradeReconcile Python Macro

Table 1: Configuration Properties

Label	Reference	Description
Reconcile	**$Configuration.B1**	Mandatory field. Enter the Questrade seed token here before the very first run otherwise authentication with the Questrade server will fail. Also delete the contents of **API Cache $Configuration.B14.**
		This value is generated by, then copied from, the Questrade portal as described in section 2.3 Questrade API Activation.
		This token is used to bootstrap the authentication engine which then stores updated authentication credentials in **API Cache $Configuration.B14** (after which this seed token is no longer valid).
		If this seed token is rejected by the Questrade server then the 2.3 Questrade API Activation procedure must be used to generate a new token, entered in this cell, and the contents of cell **$Configuration.B14 is deleted.** A reconcile can then be attempted.
Timestamp	**$Configuration.B3**	Don't edit this field. Running the QuestradeReconcile macro updates this value with the Questrade server time.
RateLimit Remaining	**$Configuration.B5**	Don't edit this field. The Questrade API implements a rate limiting system for all authenticated connections. The purpose of this functionality is to protect servers from abuse and to provide a clear indication of the remaining metered API usage.
		Running the QuestradeReconcile macro updates this value with the number of remaining requests allowed against the current limit.
RateLimit Reset	**$Configuration.B7**	Don't edit this field. Time value when the remaining limit of metered requests will renew (Unix timestamp).
Additional Symbols	**$Configuration.B10**	Optional field. A comma separated list of equity symbols.
		Equity values for these symbols are appended to the 1.2.4 Equities Sheet in addition to those already referenced by the 1.2.3 Positions Sheet sheet.
Log	**$Configuration.B12**	Don't edit this field. It is a text cell for logging macro status. This cell is overwritten with each invocation of the macro and records any errors encountered when running the script. When a reconcile operation doesn't complete as expected then check here for more information!
API Cache	**$Configuration.B14**	Delete the contents of this cell only when a new Questrade token is entered in **$Configuration.B1,** otherwise don't edit this field.
		The QuestradeReconcile macro stores authentication state negotiated with the Questrade server in this cell. It is overwritten as needed with each invocation of the macro.
		This information must be saved before the spreadsheet is closed. Failing to save the updated contents of this cell means a new token has to be generated using the Questrade portal by following 2.3 Questrade API Activation procedure.
		When you get a new token eneter it in **$Configuration.B1** and clear the contents of this cell.

1.2 Spreadsheet Fields and Formatting

This legend lists the field type, 's' for example for strings, and the corresponding spreadsheet formatting applied to that type of value. These field types are used internally by the python script and are only included here to help document the corresponding columns.

Table 2: Spreadsheet Formatting Codes

Description	Field Type	Calc Format
String	s	@
Date	d	MMM D, YYYY
Boolean	b	BOOLEAN
General	n	General
Number with 1 Decimal Place	n0	#,##0;[RED]-#,##0
Number with 2 Decimal Places	n1	#,##0.0;[RED]-#,##0.0
Number with 3 Decimal Places	n2	#,##0.00;[RED]-#,##0.00
Number with 4 Decimal Places	n3	#,##0.000;[RED]-#,##0.000
Number with 5 Decimal Places	n4	#,##0.0000;[RED]-#,##0.0000
Number with 6 Decimal Places	n5	#,##0.00000;[RED]-#,##0.00000
Currency with 2 decimal places	$	[$$-409]#,##0.00;[RED]([$$-409]#,##0.00)
Currency with 3 decimal places	$3	[$$-409]#,##0.000;[RED]([$$-409]#,##0.000)
Currency with 4 decimal places	$4	[$$-409]#,##0.0000;[RED]([$$-409]#,##0.0000)

The following sections list the supported data fields and their formatting for each sheet.

1.2.1 Accounts Sheet

https://www.questrade.com/api/documentation/rest-operations/account-calls/accounts

Table 3: Accounts Sheet Column Definitions

Column Name	Field Type	Description
number	n	Eight-digit account number (e.g., "26598145").
type	s	Type of the account (e.g., "Cash", "Margin"). See **Account Type** section for all allowed values.
clientAccountType	s	Type of client holding the account (e.g., "Individual"). See **Client Account Type** for full list of values.
status	s	Status of the account (e.g., Active). See **Account Status** for full list of values.
isPrimary	b	Whether this is a primary account for the holder.
isBilling	b	Whether this account is one that gets billed for various expenses such as inactivity fees, market data, etc.

1.2.1.1 Account Type

Table 4: Account Type Column Values

type	Description
Cash	Cash account.
Margin	Margin account.
TFSA	Tax Free Savings Account.
RRSP	Registered Retirement Savings Plan.
SRRSP	Spousal RRSP.
LRRSP	Locked-In RRSP.
LIRA	Locked-In Retirement Account.
LIF	Life Income Fund.
RIF	Retirement Income Fund.
SRIF	Spousal RIF.
LRIF	Locked-In RIF.
RRIF	Registered RIF.
PRIF	Prescribed RIF.
RESP	Individual Registered Education Savings Plan.
FRESP	Family RESP.

1.2.1.2 Client Account Type

The following table specifies all supported account client types.

Table 5: Client Account Type Column Values

clientAccountType	Description
Individual	Account held by an individual.
Joint	Account held jointly by several individuals (e.g., spouses).
Informal Trust	Non-individual account held by an informal trust.
Corporation	Non-individual account held by a corporation.
Investment Club	Non-individual account held by an investment club.
Formal Trust	Non-individual account held by a formal trust.
Partnership	Non-individual account held by a partnership.
Sole Proprietorship	Non-individual account held by a sole proprietorship.
Family	Account held by a family.
Joint and Informal Trust	Non-individual account held by a joint and informal trust.
Institution	Non-individual account held by an institution.

1.2.1.3 Account Status

The following table specifies all supported account status values.

Table 6: Account Status Column Values

status
Active
Suspended (Closed)
Suspended (View Only)
Liquidate Only
Closed

1.2.2 Balances Sheet

https://www.questrade.com/api/documentation/rest-operations/account-calls/accounts-id-balances

Table 7: Balances Sheet Column Definitions

Column Name	Field Type	Description
balanceType	s	The type of balance is one of **perCurrencyBalances**, or **combinedBalances**.
account	n	Eight-digit account number (e.g., "26598145").
accountType	s	Type of the account (e.g., "Cash", "Margin"). See **Client Account Type** section for all values.
currency	s	Currency of the balance figure (e.g., "USD" or "CAD").
cash	$	Balance amount.
marketValue	$	Market value of all securities in the account in a given currency.
totalEquity	$	Equity as a difference between cash and marketValue properties.
buyingPower	$	Buying power for that particular currency side of the account.
maintenanceExcess	$	Maintenance excess for that particular side of the account.
isRealTime	b	Whether real-time data was used to calculate the above values.

1.2.3 Positions Sheet

https://www.questrade.com/api/documentation/rest-operations/account-calls/accounts-id-positions

Table 8: Positions Sheet Column Definitions

Column Name	Field Type	Description
account	n	Eight-digit account number (e.g., "26598145").
accountType	s	Type of the account (e.g., "Cash", "Margin"). See **User Account Type** section for all allowed values.
currency	s	Currency of the equity (e.g., "USD" or "CAD").
symbol	s	Equity symbol.
symbolId	n	Internal symbol identifier.
openQuantity	n3	Position quantity remaining open.
currentPrice	$	Current price of the position symbol.
currentMarketValue	$	Market value of the position (quantity x price).
averageEntryPrice	$3	Average price paid for all executions constituting the position.
totalCost	$	Total cost of the position.
openPnl	$	Unrealized profit/loss on this position.
dayPnl	$	Unrealized profit/loss on this position based on open current prices.
closedQuantity	n3	Portion of the position that was closed today.
closedPnl	$	Realized profit/loss on this position.
isUnderReorg	b	Designates whether a symbol is currently undergoing a reorg.
isRealTime	b	Designates whether real-time quote was used to compute PnL.

1.2.4 Equities Sheet

https://www.questrade.com/api/documentation/rest-operations/market-calls/symbols-id

Table 9: Equities Sheet Column Definitions

Column Name	Field Type	Description
account	n	Eight-digit account number (e.g., "26598145").
accountType	s	Type of the account (e.g., "Cash", "Margin"). See **User Account Type** section for all allowed values.
currency	s	Currency of the equity (e.g., "USD" or "CAD").
symbol	s	Equity symbol namer.
symbolId	n	Internal symbol identifier.
description	s	Symbol description (e.g., "Microsoft Corp.").
listingExchange	s	Primary listing exchange. See **Listing Exchange** section for the list of all listing exchanges.
securityType	s	Security type (e.g., "Stock"). See **Security Type** section for all allowed values.
prevDayClosePrice	$	Closing trade price from the previous trading day.
yield	n4	Dividend yield (dividend / prevDayClosePrice).
pe	n4	Trailing 12-month price to earnings ratio.
eps	n4	Trailing 12-month earnings per share.
outstandingShares	n0	Total number of shares outstanding.
marketCap	n0	Market capitalization (outstandingShares * prevDayClosePrice).
averageVol20Days	n0	Average trading volume over trailing 20 days.
averageVol3Months	n0	Average trading volume over trailing 3 months.
dividend	n4	Dividend amount per share.
dividendDate	d	Dividend declaration date.
exDate	d	Dividend ex-date.
lowPrice52	$	52-week high price.
highPrice52	$	52-week high price.
tradeUnit	b	Smallest number of units that can be traded.
pay	$	**dividend** per share column multiplied by number of shares normalized to CAD.

1.2.4.1 Listing Exchange

The following table specifies all supported listing exchanges.

Table 10: Listing Exchange Column Values

listingExchange	Description
TSX	Toronto Stock Exchange.
TSXV	Toronto Venture Exchange.
CNSX	Canadian National Stock Exchange.
MX	Montreal Exchange.
NASDAQ	NASDAQ.
NYSE	New York Stock Exchange.
NYSEAM	NYSE AMERICAN
ARCA	NYSE ARCA.
OPRA	Option Reporting Authority.
PinkSheets	Pink Sheets.
OTCBB	OTC Bulletin Board.

1.2.4.2 Security Type

The following table specifies all supported security types.

Table 11: Security Type Column Values

securityType	Description
Stock	Common and preferred equities, ETFs, ETNs, units, ADRs, etc.
Option	Equity and index options.
Bond	Debentures, notes, bonds, both corporate and government.
Right	Equity or bond rights and warrants.
Gold	Physical gold (coins, wafers, bars).
MutualFund	Canadian or US mutual funds.
Index	Stock indices (e.g., Dow Jones).

1.2.5 Activities Sheet

Account activities, including cash transactions, dividends, trades, etc.

https://www.questrade.com/api/documentation/rest-operations/account-calls/accounts-id-activities

Table 12: Activities Sheet Column Definitions

Column Name	Field Type	Description
account	n	Eight-digit account number (e.g., "26598145").
accountType	s	Type of the account (e.g., "Cash", "Margin"). See **User Account Type** section for all allowed values.
currency	s	Currency of the equity (e.g., "USD" or "CAD").
transactionDate	d	Transaction date.
symbol	s	Equity symbol name.
symbolId	n	Internal symbol identifier.
type	s	Activity Type
action	s	No documentation from Questrade.
quantity	n3	The quantity
price	$4	The price
grossAmount	$	Gross amount
commission	$	The commission
netAmount	$	Net Amount
tradeDate	d	Trade date
settlementDate	d	Settlement date
description	s	No documentation from Questrade.

2 Installation and Configuration

The spreadsheet file must have six sheets with the following names: Accounts, Balances, Positions, Equities, Activities, and Configuration. Except for the Configuration sheet any existing data on these sheets will be cleared when the QuestradeReconcile python macro is run. Data from the Questrade on-line platform will be used to update these sheets. The sheets can be moved within the file: sheet order does not affect anything. Any other sheets in the file are ignored.

The Configuration sheet must have the following cells defined for the QuestradeReconcile macro to function correctly. In the Sample spreadsheet file the adjacent cells to the left are used as labels. The labels are not required by the macro the value can be changed as desired. Add these cells to your custom Configuration sheet. See Table 1: Configuration Properties.

The configuration items can be changed to different pages or cell locations by modifying the python code. See **config** values at the top of the `QuestradeReconcile.py` macro file. It can be modified by using a Windows text editor such as Notepad. Normally these cell references are left as is. Don't touch unless you have examined the Configuration python class an know exactly what it does and how it works.

```
__token         = '$Configuration.B1'
__timestamp     = '$Configuration.B3'
__api_remaining = '$Configuration.B5'
__api_reset     = '$Configuration.B7'
__equitylist    = '$Configuration.B10'
__loglevel      = '$Configuration.B12'
__log           = '$Configuration.B15'
__apicache      = '$Configuration.B17'
```

Only the authentication key in cell B1 has to be updated to allow authentication with the Questrade server. The `QuestradeReconcile.py` macro will update the other fields as necessary.

The following sections describe the installation steps necessary to run the QuestradeReconcile python macro and to configure the authentication token in cell B1.

2.1   LibreOffice Installation

Go to https://www.libreoffice.org/download/download/ to download and find installation instructions for the LibreOffice suite.

Figure 2: LibreOffice Download at www.libreoffice.org

When LibreOffice installation is complete verify:

- Directory "**C:*Program Files\LibreOffice\program*"** exists and the ***python.exe*** file can be found there.
- Launch LibreOffice Calc using whatever method you like. Verify that it starts without error.

2.2 LibreOffice Macro Security Configuration

LibreOffice macros must be enabled to run the QuestradeReconcile python script. Open the Calc Sample spreadsheet and navigate to the *[Tools → Options]* dialog or press *[Alt+F12]*.
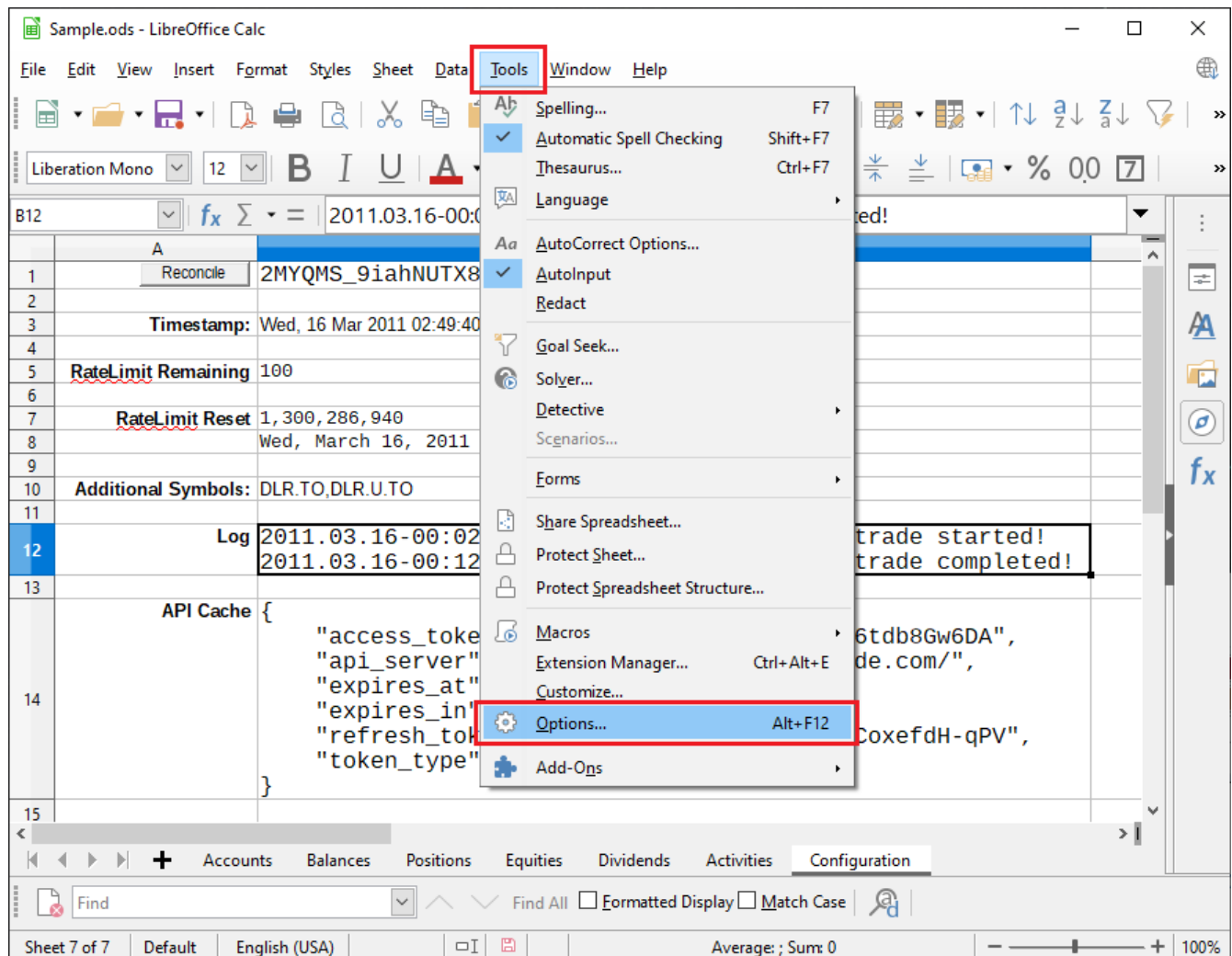
Figure 3: LibreOffice Tools Options

Set security to **Medium** to require confirmation before the QuestradeReconcile python macro will run.
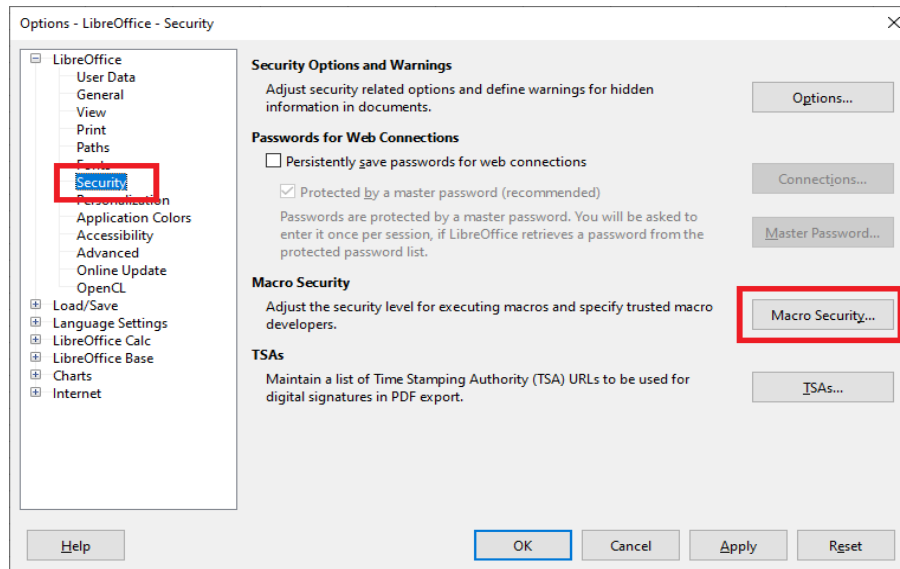
Figure 4: LibreOffice Macro Security
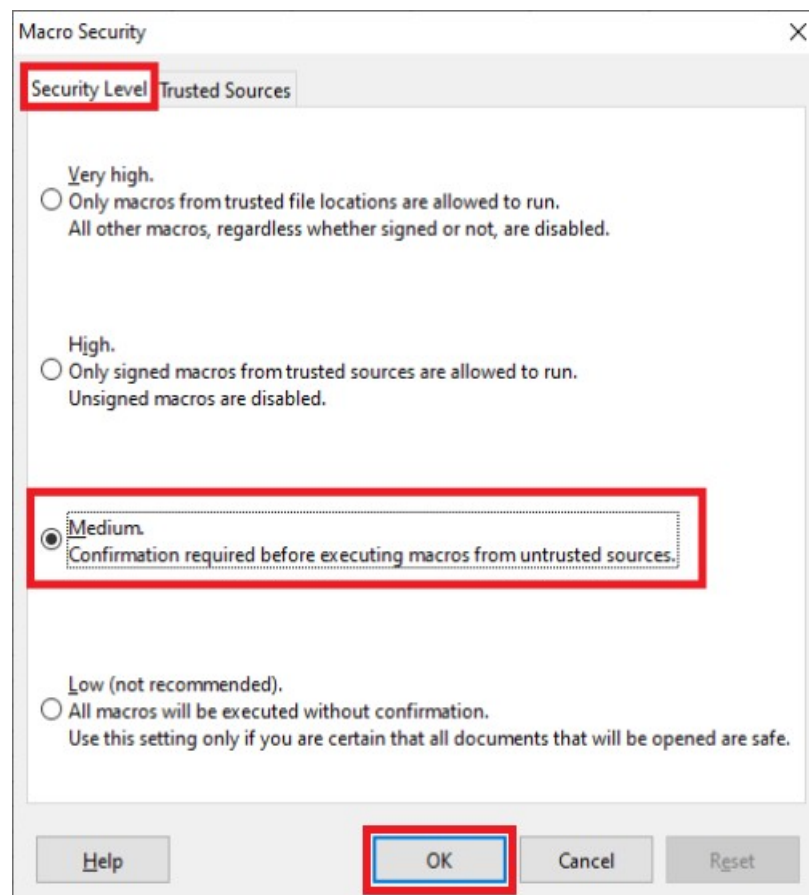
Figure 5: LibreOffice Medium Security Level

Verify that python macros are enabled by choosing the *[Tools → Macros → Run Macro]* menu option from within LibreOffice Calc
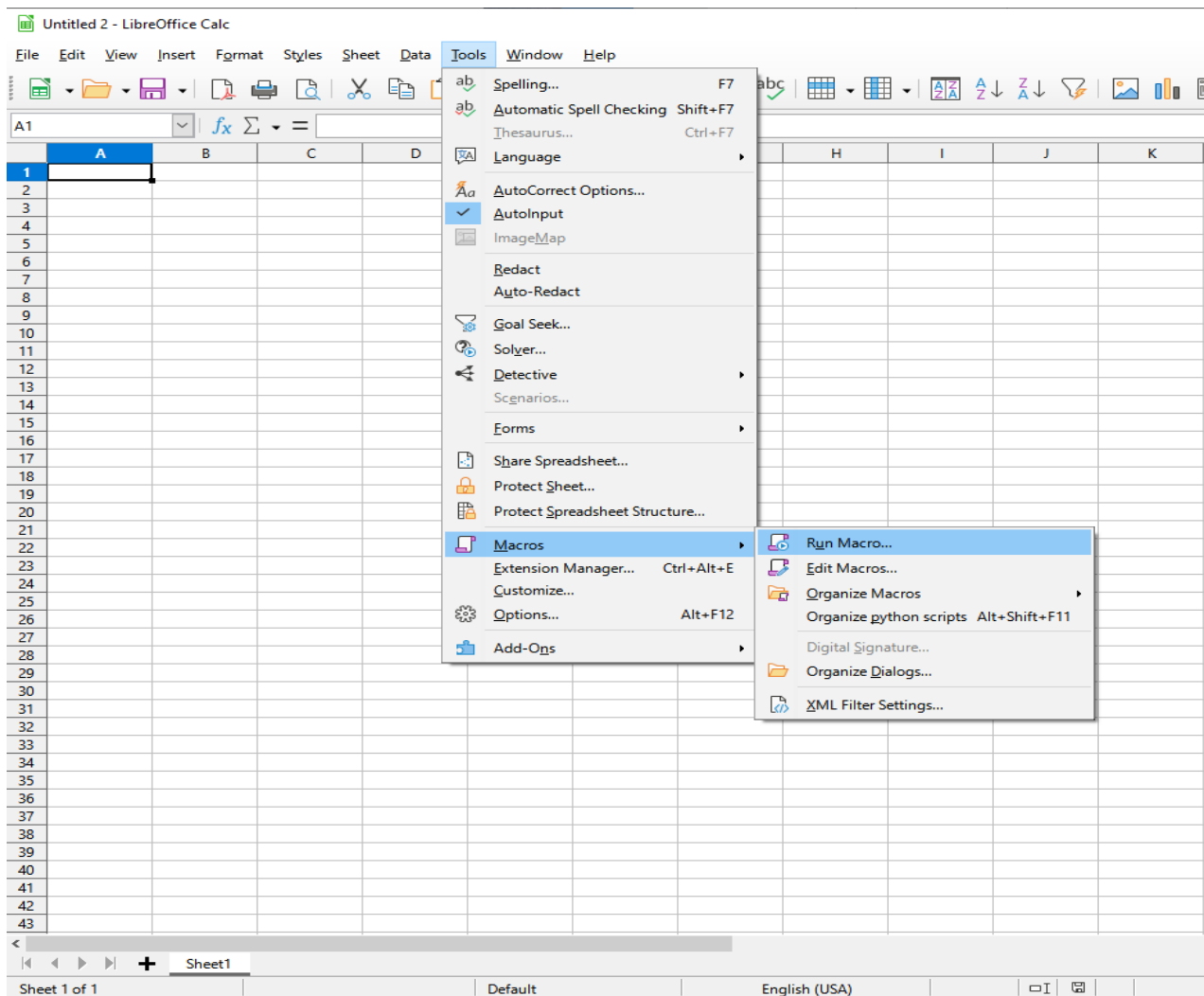
Figure 6: Tools -> Macros -> Run Macro

Run **HelloWorldPython** from the **LibreOffice Macros HelloWorld** Library.
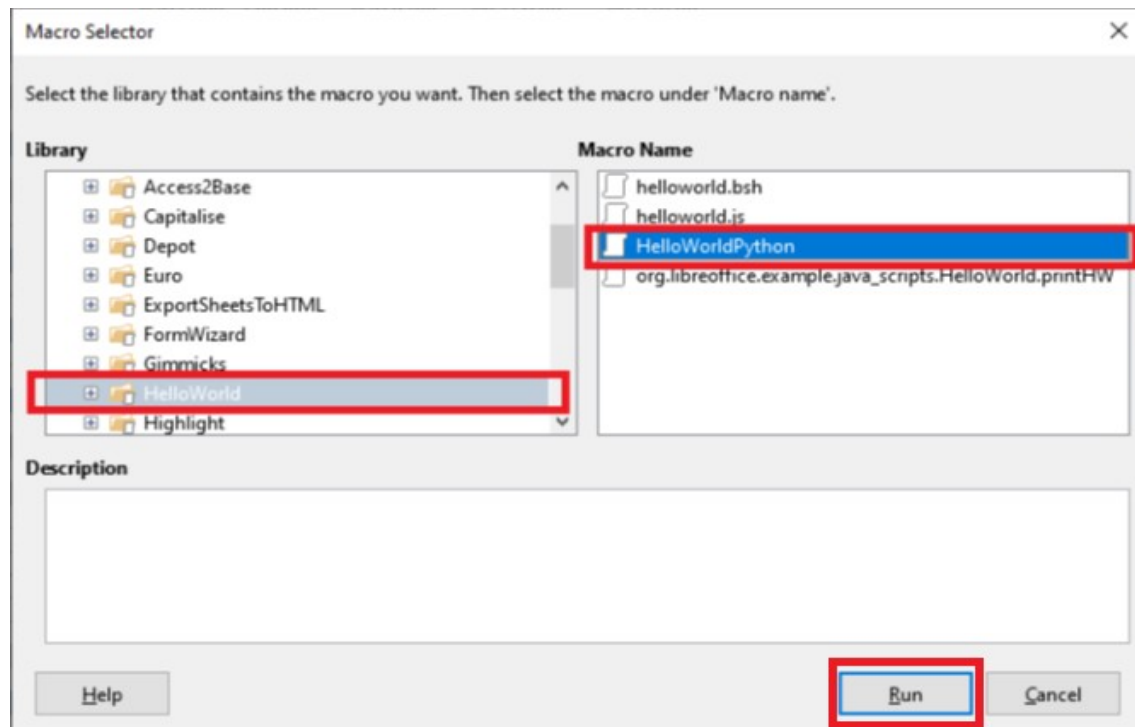
Figure 7: LibreOffice Run HelloWorldPython

The **HelloWorldPython** macro will open a LibreOffice Writer document showing "Hello World (in Python)" when successful.
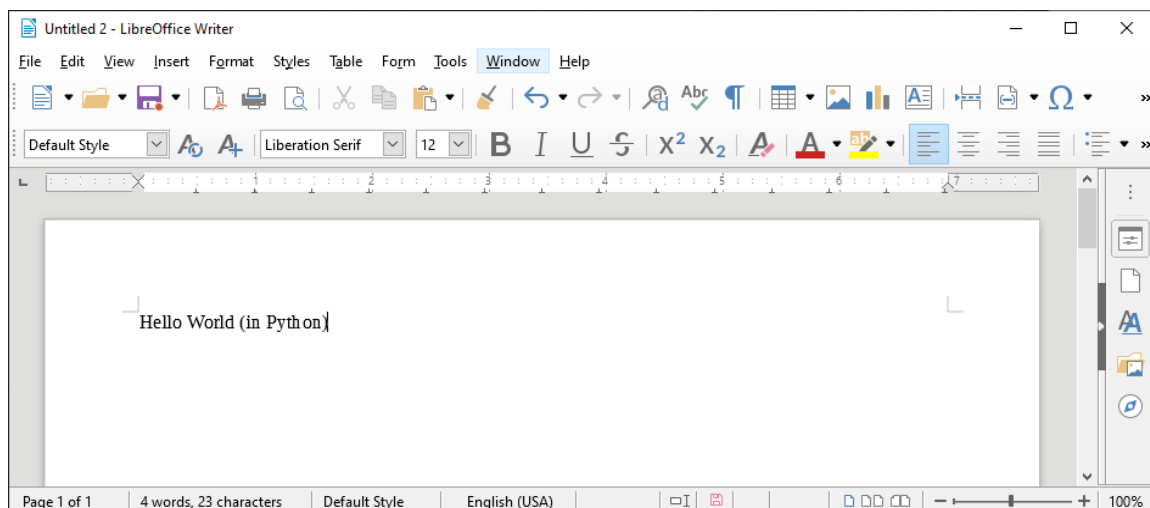
Figure 8: LibreOffice HelloWorld (in Python)

2.3   Questrade API Activation

The Questrade platform implements security measures as defined by the OAuth 2.0 protocol. To allow QuestradeReconcile to be authorized by the Questrade platform a refresh token is needed. This token is obtained by registering the QuestradeReconcile application and then by generating a time limited authorization token within the Questrade web portal.

2.3.1 Create Questrade Token

First, log into Questrade web portal and navigate to settings from the *[Client Name]* pull-down menu.
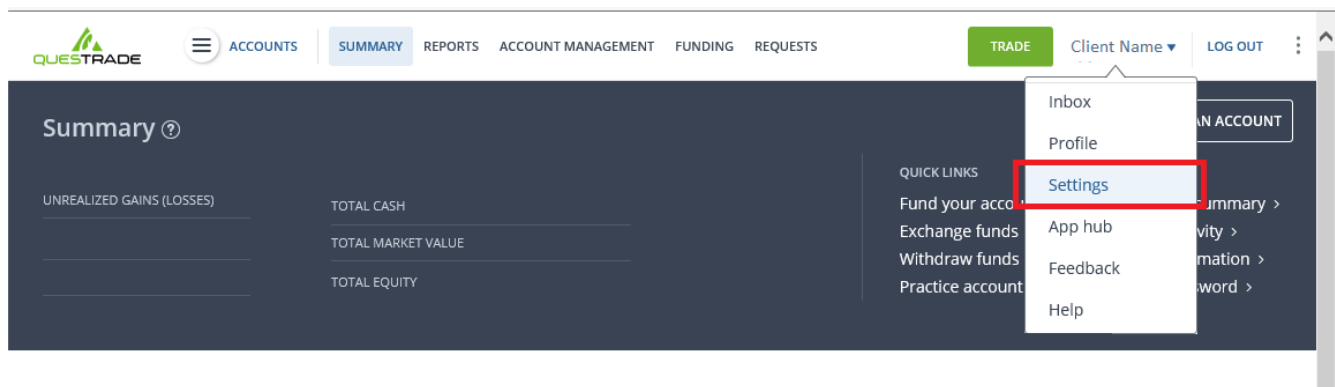
Figure 9: Questrade Launch Settings Menu

Read the Questrade API terms and conditions and agree that you wish to enable authenticated connections from QuestradeReconcile. Rejecting the terms and conditions means the macro will not be permitted to access the Questrade API and the QuestradeReconcile macro will fail.

Figure 10: Questrade Settings Dialog

Register QuestradeReconcile as a personal application.

Figure 11: QuestradeReconcile Security Dialog

Generate a refresh token. DON'T CLOSE THE POP-UP WINDOW. Read the next step before proceeding.

Figure 12: Questrade Security Token Dialog

Copy the token from the Questrade pop-up window into the Sample spreadsheet or within your own customized spreadsheet then close the Questrade pop-up window.

The only guaranteed method of copying the token is to select it as a text block in the browser, then copy using the right-click context menu, then paste into the spreadsheet cell. Don't close the pop-up window until you've verified the copied text is identical.

The pop-up window is the only permanent record of the token so closing the window without first copying means the token is lost forever and a new one must be generated.
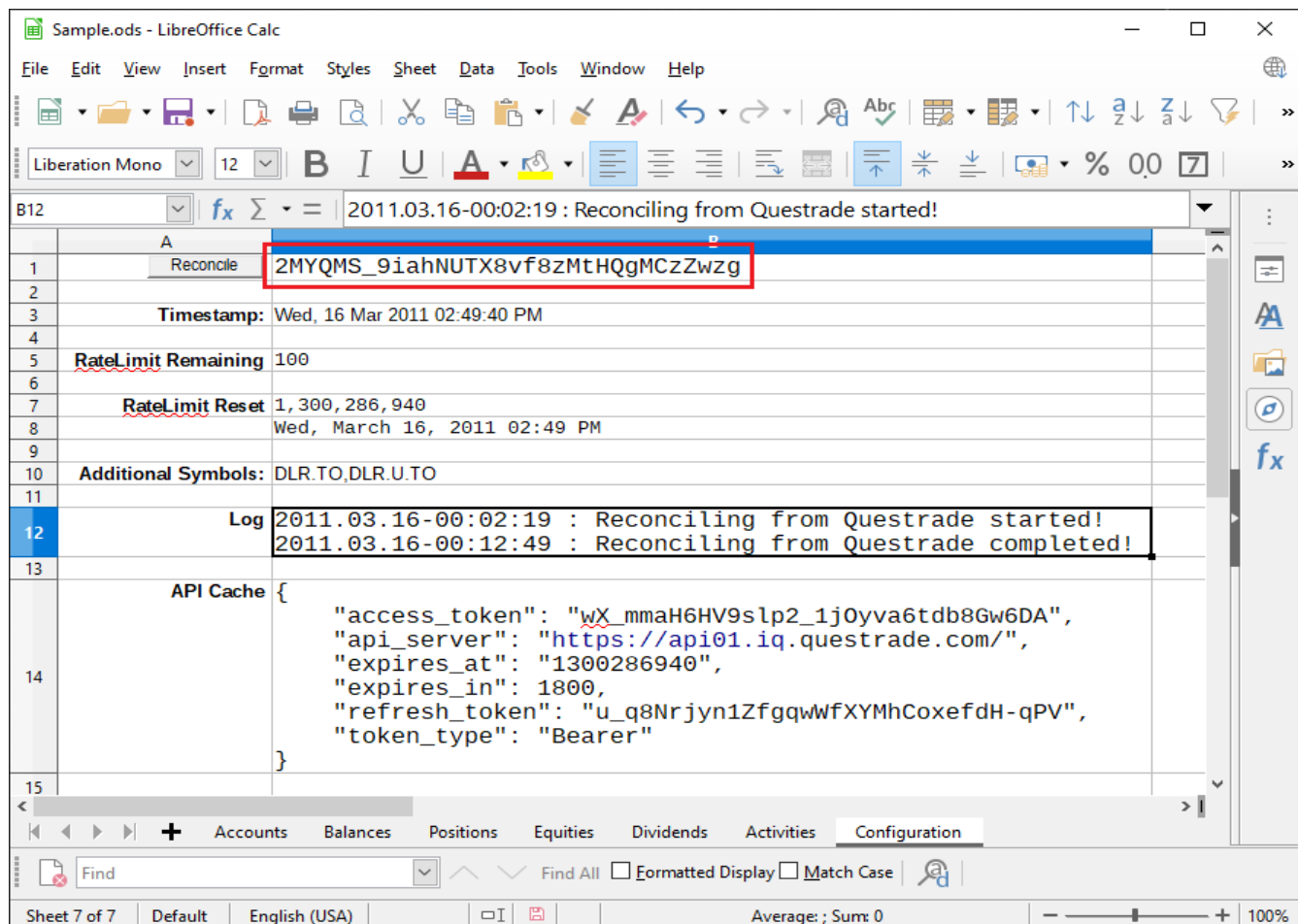
Figure 13: LibreOffice QuestradeReconcile Security Token Configuration

To revoke authorization at any time click Delete within the Questrade Personal apps menu shown above.

2.5 Python Questrade Macro Installation

The QuestradeReconcile macro must be installed into the LibreOffice python Scripts directory and the Questrade API wrapper goes into the LibreOffice python site-packages directory.

First download the ZIP file from https://github.com/kerouac01850/questrade-reconcile.

Click on *[Clone or Download]* button then select *[Download ZIP]* to download *questrade‑reconcile‑master.zip* into your download directory.
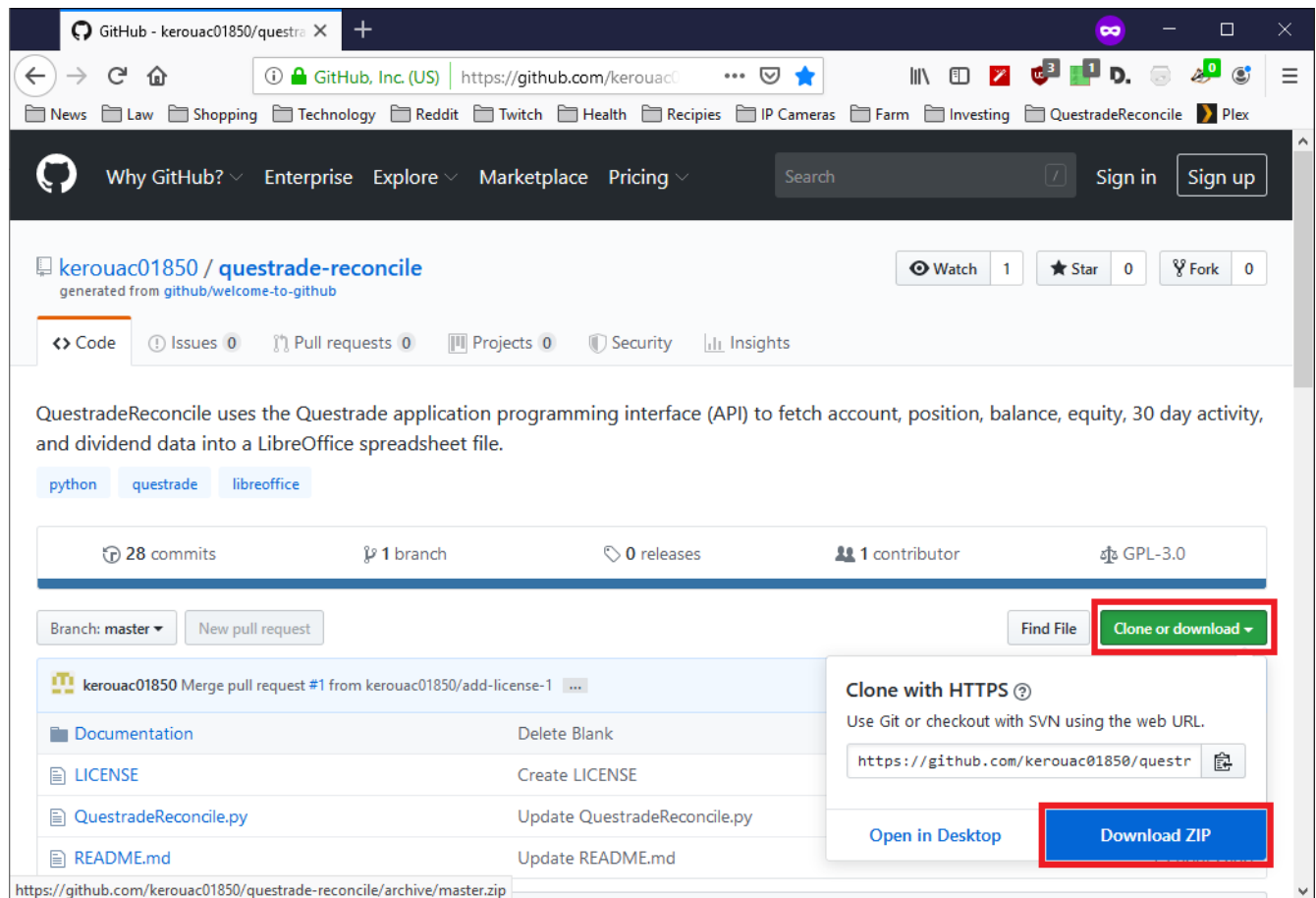

Figure 14: questrade-reconcile-master Download Zip

Next, download the **questrade-api-master.zip** ZIP file from **https://github.com/kerouac01850/questrade-api**.

Click on [Clone or Download] button then select *[Download ZIP]* to download *questrade‑api‑master.zip* into your download directory.*

From the download directory select the *questrade‑reconcile‑master.zip* file and then use the right-click Windows context menu to extract all files from the ZIP archive into the download directory.
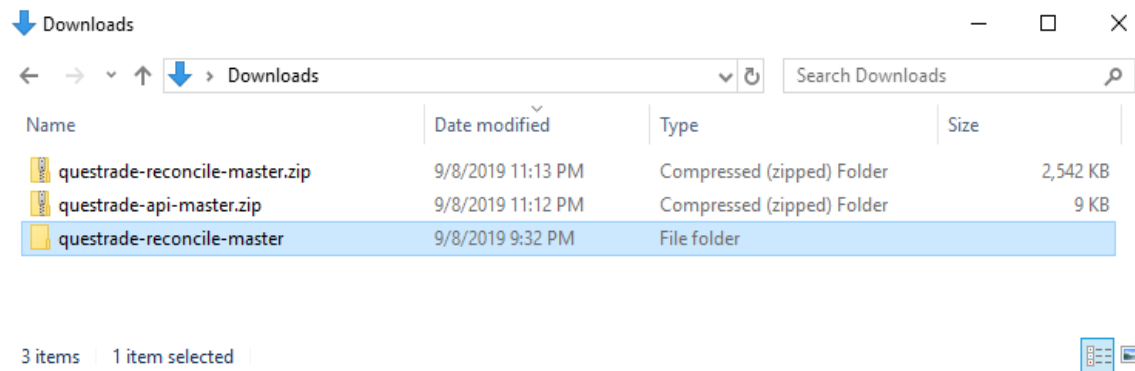
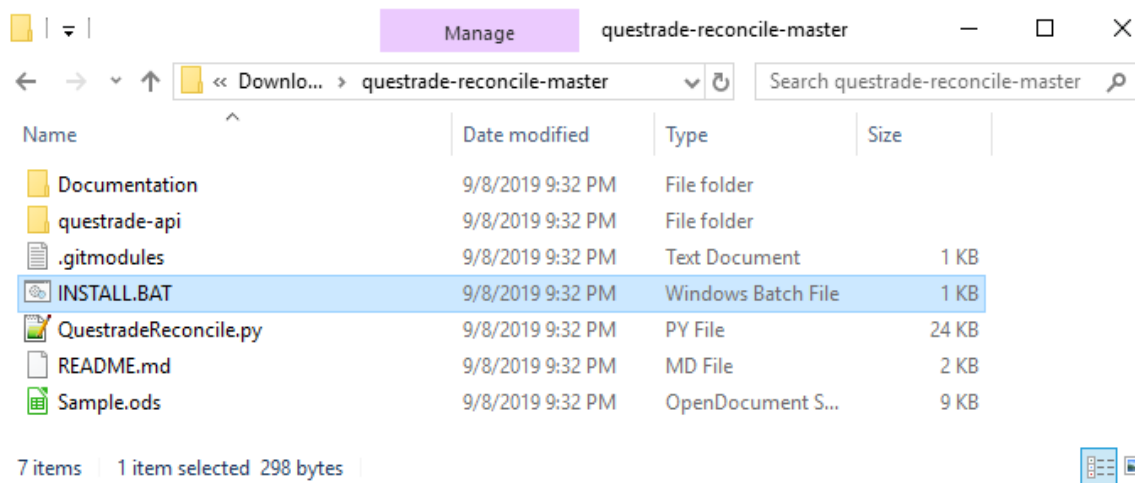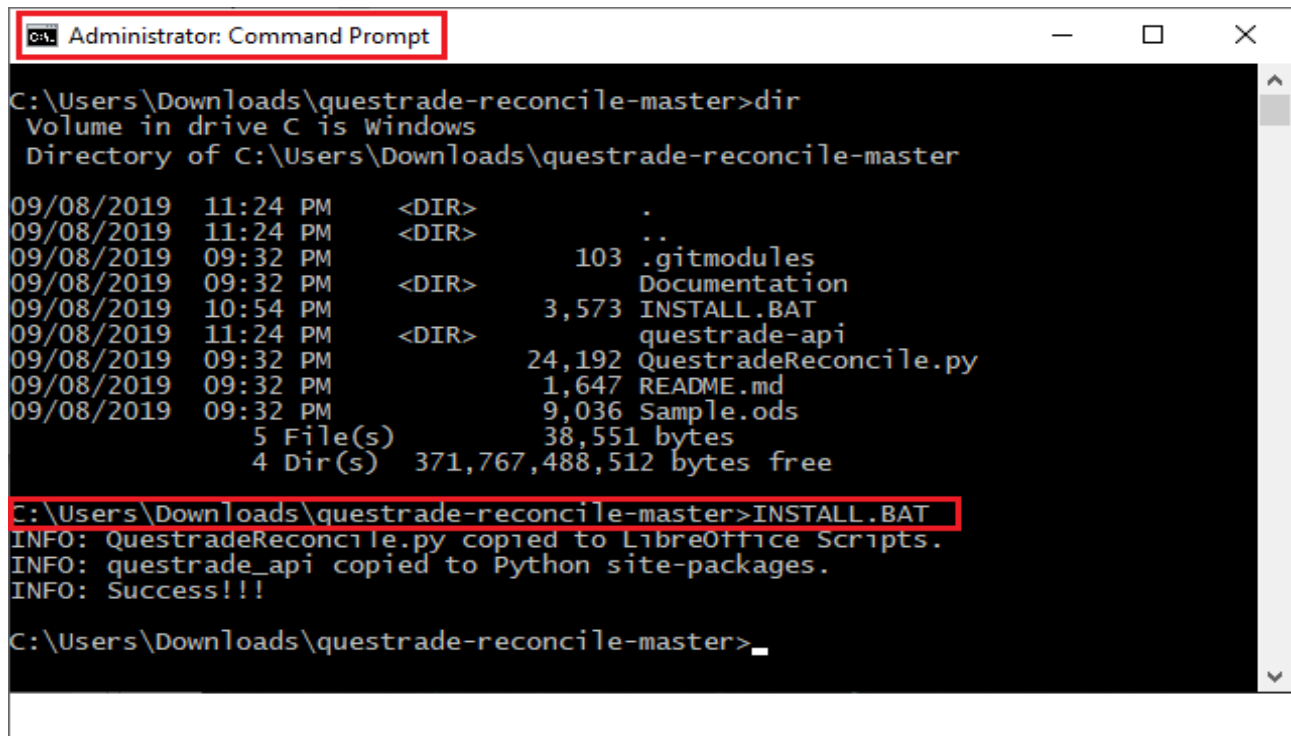*Figure 15: Downloads and Extracted questrade-reconcile-master Folder*

Figure 16: Contents of Extracted questrade-reconcile-master Folder

Open an Administrator command prompt window and navigate to the Downloads directory. Run INSTALL.BAT.

Figure 17: Administrator Window INSTALL.BAT

Installation Done. Proceed to 1.1 Reconcile a Spreadsheet with Questrade.Hello World (in Python)Hello World (in Python)