



Qube Research & Technologies Trading & Risk Management Academy

User Guide

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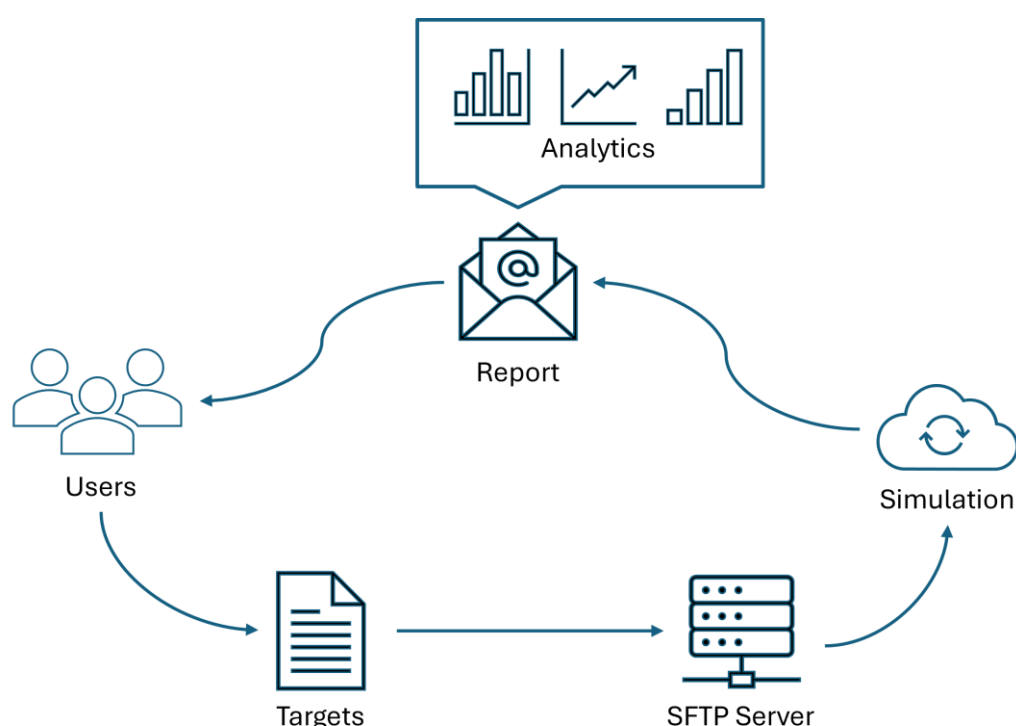
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1 Introduction

The QRT Trading and Risk Management Academy program enables students from partner universities to develop their own trading algorithms and manage hypothetical portfolios over several months, simulating real-world trading scenarios. Participants can "paper-trade" by submitting portfolio targets and receiving daily performance and risk reports based on actual market data.

To trade, users prepare CSV files specifying the state of their portfolio using instrument codes and notional amounts. Trading positions are then calculated, and portfolio performance is simulated according to real market returns. A detailed feedback report covering P&L, risk assessment, and position summary will be sent daily.



This guide explains how to send your notional targets to QRT for the simulation of your strategies as well as the parameters of the trading simulation.

You will find the steps to follow for:

1. Preparing and sending targets via SFTP.
2. Understanding the calculation of metrics (P&L, costs, positions, GMV, and risk).
3. Exploring the provided reports.



2 Submitting Portfolio Targets

2.1 SFTP Setup

A generic account has been created for your group. You will be provided with:

- the group name (e.g. UNI01)
- a SFTP username (e.g. q1234)
- a pair of asymmetric cryptographic SSH key files

The private key file (e.g. uni101_id_rsa) is effectively the password necessary to upload your portfolio targets to the SFTP. The public key (e.g. uni101_id_rsa.pub) is shared for reference only.

2.2 Client Code

To facilitate your interaction with our platform, we have written a tool that transforms a **dataframe** of portfolio targets into a well formatted **CSV file** ready for upload and ingestion. The code is written in **Python**. If you decide to use Python, the integration with this tool will be seamless. If you prefer to use a different language, you will need to generate the CSV file yourself. Then, you can switch to Python to validate and upload using our client code. Or, alternatively, you can upload manually using the FTP client software of your choice (e.g. WinSCP or FileZilla).

The next sections of this document assume Python is your language of choice.

2.3 Environment Setup

You need a **Python interpreter** installed (we recommend 3.11+) as well as a **virtual environment** to isolate your project and the dependencies necessary to use our QSEC Client tool. There are many Python packaging tool available (e.g. conda, poetry or uv). Below is an example using **conda**:

```
conda create -n qsec python=3.11 -y
conda activate qsec
conda install -c conda-forge pandas paramiko ipyhton -y
```

2.4 Generate a dataframe of portfolio targets

You will be creating an algorithmic investment strategy. You need one output of your program to be the latest set of notional targets that fully describe your portfolio. This should be a dataframe of 3 columns:

- **internal_code**: the RIC used by our platform
- **currency**: the currency of your notional
- **target_notional**: the signed amount of currency you want to invest in the instrument

```
pdb> print(targets)
internal_code  currency  target_notional
code1         USD      100.0
code2         EUR     -120.0
```



2.5 Prepare a targets CSV file

The function **prepare_targets_file** takes the dataframe of targets describe previously and three additional parameters to create a well formatted, valid CSV file ready for upload to QRT's SFTP server where it will be parsed and uploaded to our database. The function parameters are:

- the targets Dataframe
- the group ID you have been assigned (e.g. UNI01)
- the equity trading region of your portfolio (**AMER** or **EMEA**)
- the output directory path where the targets CSV file will be written

⇒ The function returns the path to the generated CSV file.

	A	B	C	D	E	F	G	H	I	J	K	L
1	id_specific	extra_key	value_ts	strategy	internal_code	ric	ticker	target_notional	currency	target_contracts	ref_price	advisor_name
2	OXON_G00	OXON_G00_code1	2024-10-22 13:42	OXON_G00_AMER	code1	code1	code1	100 USD		0	0	OXON_G00
3	OXON_G00	OXON_G00_code2	2024-10-22 13:42	OXON_G00_AMER	code2	code2	code2	-120 EUR		0	0	OXON_G00

Note: It is recommended to not open and manipulate the targets CSV file using Excel, as it may change the date format.

2.6 Upload a target file

The function **upload_targets_file** reads a CSV of portfolio targets, validates it against our strict schema and uploads it to the specified SFTP account. The function parameters are:

- the path to the targets CSV file
- the region (**AMER** or **EMEA**)
- the SFTP username provided by QRT
- the path to the private key file provided by QRT
- QRT's SFTP host address: **sftp.qrt.cloud**

Example usage:

```
In [13]: upload_targets_file(path, "AMER", " ", "oxon_g00_id_rsa", "sftp.qrt.cloud")
Found 0 error(s) while validating qrt_academy_OXON_G00_20241101-0217.csv
Reading private key from: oxon_g00_id_rsa
Connecting to sftp.qrt.cloud:22
Logging in as 
Uploading qrt_academy_OXON_G00_20241101-0217.csv to incoming/amer/qrt_academy_OXON_G00_20241101-0217.csv
File 'qrt_academy_OXON_G00_20241101-0217.csv' successfully uploaded to AMER.
```



3 Targets, Limits, Execution and Costs

This section describes how your targets will be converted to actual positions in your portfolio.

3.1 Targets / Positions

Your actual positions will exactly match your notional targets (within liquidity constraints). As a result, your actual positions will not necessarily correspond to a round number of shares. Positions are maintained at a **constant dollar notional**, not a constant number of shares. Some trading might be required to keep the dollar constant position. Trading costs are not charged for such trading.

3.2 Trading Universe

The trading universe is made up of the constituents of two regional broad market indices:

- **AMER**: the Russel 3000 Index
- **EMEA**: the STOXX Europe 600

Stocks whose 3-month Average Daily Volume (**ADV**) is below **5M USD** are filtered out.

$$ADV_t = \frac{1}{60} \sum_{i=1}^{60} USD\ Volume_{t-i}$$

Where ADV_t is the average Daily volume and $USD\ Volume_t$ is the daily volume in USD at t .

3.3 Hedging

Excessive residual beta of equity books will be **automatically hedged**, using the following methodology:

- Compute the **beta** of each stock of your portfolio:

$$Beta = 0.2 + 0.8 * \frac{covariance_{250d}(stock, benchmark)}{variance_{250d}(benchmark)}$$

- Hedge all the exposure with the benchmark buy taking a position equal to $-Beta$
- List of **benchmarks**:
 - o AMER: SPX (S&P 500)
 - o EMEA: Eurostoxx50

3.4 Trading limits

There are some **trading limits** for single stocks:

- Max position = 2.5% of the 60 trading days ADV
- Max traded per day = 2.5% of the 60 trading days ADV

For single stocks, there is also a **max position** in term of USD:

- Max position = 2 M USD

If the implied trading by targets exceeds the above limits, the position will be kept constant until all limits are not exceeded anymore.



3.5 Execution and trading costs

The execution price will be the **mid-price at the end of the next minute** after we have received your file (without format error) on the ftp. Additional **execution costs of 2bps** also apply, along with **0.5% (annually) for financing**.

100% of dividends are paid on short positions. 70% of dividends are received on long positions.

3.6 Risk calculation and limit

The ex-ante risk of your portfolio is given by:

$$Risk_t = \sqrt{X_t^T \cdot \Sigma_t \cdot X_t}$$

Where: X_t are the portfolio weights at t and Σ_t is the covariance matrix of asset returns.

Positions on all regional books are considered. In practice, the process to get the risk measure is as follow:

- Select the last 60 daily returns for all the instruments
- Compute the book's daily P&L series that you *would have had* with today's position using $pnl_t = positions_{t-1} \cdot return_t$
- Compute the standard deviation of these daily P&L
- Multiply by the square root of 252 to annualise

The risk limit is set at **500k USD**.

3.7 Simulation parameters

The table below recaps the various trading simulation parameters. These are subject to change throughout the competition. Any update will be communicated promptly.

Parameter	Value
Asset class	Equities
Regions	AMER, EMEA
Universe	Russel 3000, Stoxx 600
Trading Hours	Standard per region
Execution Cost	2bps
Spread Cost	None (execution at mid)
Financing Cost	0.5% annualised on GMV
Dividend Tax	30%
Max Traded / Day	2.5% ADV
Position Limit	2.5% ADV
Auto-hedging	TRUE
Risk Limit	500k USD annualised

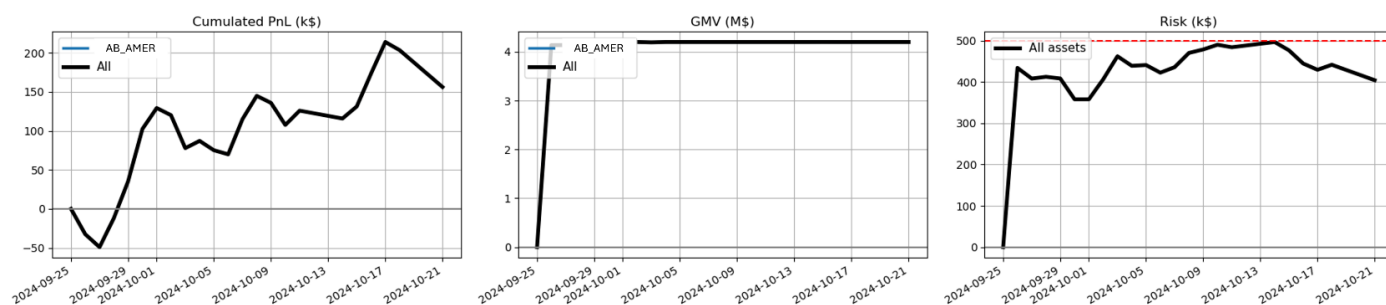


4 Daily Report

A report will be sent daily, by email, around 10am UK time (delay might occur). It presents a set of summary analytics as well as a snapshot of end-of-day positions for the previous trading day will be attached to the email.

4.1 Overview charts

Here is an example of the P&L, GMV and Risk charts from the report:



The **P&L** represents the cumulative dollar **Profit and Loss** of your portfolio over time.

The **GMV** (Global Market Value) refers to the **total market value** of all positions in your portfolio. It includes the sum of the absolute value of both long and short positions, expressed in dollars terms.

Example:

If a portfolio holds \$10 million in long positions and \$5 million in short positions, the **GMV** will be **\$15 million**. This represents the total market exposure, regardless of whether some positions are long or short.

The annualised **Risk in dollars** is a measure of the **volatility** or uncertainty associated with the portfolio's value. It quantifies how much the portfolio could potentially lose (or gain) on average in a trading year based on historical or expected volatility.

4.2 Performance Table

	Day PnL(k\$)	MTD PnL(k\$)	QTD PnL(k\$)	YTD PnL(k\$)	Risk(k\$)	GMV(M\$)	Traded(M\$)	12M SR	6M Corr SP500 (%)
AB_AMER	-27	54	54	156	386	3.40	1.37	3.53	-7.4
AB_EMEA	12	-23	-23	42	261	2.90	0.91	2.42	-9.1
All	-15	31	31	198	404	6.30	2.28	3.15	-8.5

This table shows a breakdown of your strategy's **cumulative P&L per region** and aggregated over various time periods.



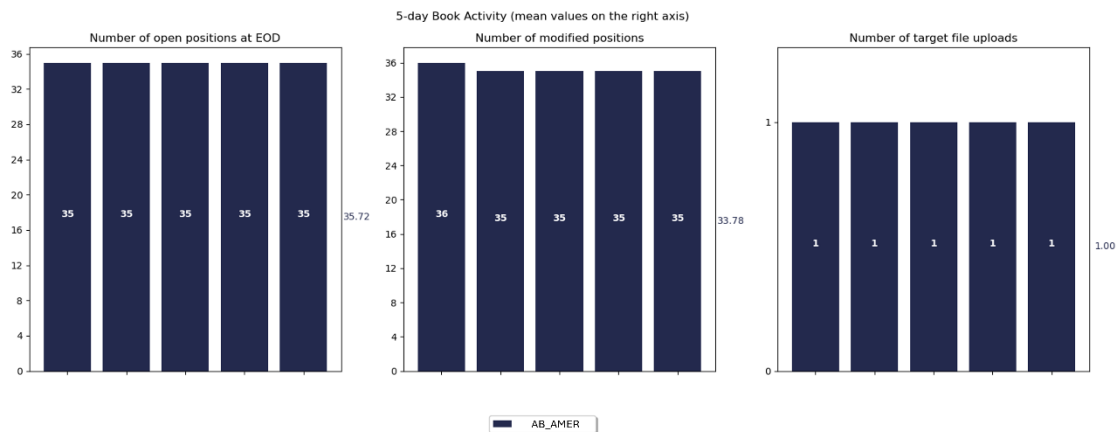
The **Sharpe ratio** measures the annualised average return per unit of risk.

$$SR = \frac{\sqrt{252} * \bar{R}}{\sigma(R)}$$

Where \bar{R} Is the average portfolio returns over the window (12 months in the report).

The **correlation** to the S&P 500 measures how the returns of a given asset move in relation to the returns of the **S&P 500 index**, which represents a broad measure of the performance of the U.S. stock market.

4.3 Activity Charts



This chart will show the activity of your books for the last 5 days. They count how many positions are open at end-of-day, how many were modified and the number of file uploads.