# EXCHANGE AND ALGORITHMIC TRADING – PART 1: UNDERSTAND THE MARKET

This task we would like interns to gain a better understanding of exchanges.
We will focus on the US stock exchanges: NASDAQ & NYSE.
Please write a report to summarize the following information. It is expected that the students research the following questions to an actionable level for implementation.
The research report will be your base for an upcoming task – implementing the trading algorithms and a simple smart order routing software.

## 01 Market Details:

- **A** Market start-time & end-time
- **B** Open & close auction rules
- **C** After and before market hour trading rules
- **D** Available order types and matching rules (e.g. priority)

## 02 Alternative Venues & Trading Systems:

- **A** Dark pools
  - i.Why dark pools?
  - ii.How does it work?
  - iii.What issues do dark pools have?
- **B** Smart order routing
  - i.Why smart order routing?
  - ii.How does it work?

# 03

## Agency Trading algorithms

**1.Please research on the following algorithms listed in this document:**

Although the algorithm listed in this document is for FX, it is commonly used across other instrument classes.

**2. Given your understanding about the exchange from part 1, please write down sudo-code for the following algorithms listed on the document:**

i.Whisper
ii.TWAP
iii.VWAP
iv.Decipher
v.Iceberg

**Remember to consider the following edge cases:**
**1) Order incompletion 2) inadequate liquidity 3) Open & close auctions.**

# 04

Continue part 3, considering that there are multiple brokers offering similar algorithms.

**a.Please list the possibilities on how different brokers might have different implementations.**

**b.Please help devise metrics for measuring performance of each algorithms.**

**You may consider reading the following materials to supplement your learning and research for this task:**

- Algorithmic Trading and DMA: An introduction to direct access trading strategies
- Algorithmic Trading: A Practitioner's Guide
- The Science of Algorithmic Trading and Portfolio Management: Applications Using Advanced Statistics, Optimization, and Machine Learning Techniques