CODE2CONNECT
MATCHING ALGO

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TABLE OF CONTENTS

01

OVERVIEW

High Level Overview of
Matching Algorithm

OVERVIEW

Data Structures:

Client balances: Dictionary
Orders: Dictionary of Dictionaries

Order book:

Each Instrument is mapped to 4 heaps

- Buy_limit_order_heap
- Sell_limit_order_heap
- Buy_market_order_heap
- Sell_market_order_heap

Using heaps allows us to easily access and “pop” the “best”/most optimal buy/sell order

OVERVIEW

Preprocessing:

Given all orders of the day, we run a blanket check on the following Policies:

- Instrument Check
- Currency Check
- Lot Size Check

We remove orders that are rejected and pass the filtered orders into the matching algorithms.

This process can be replicated to run as every order enters the market.

OVERVIEW

Open/ Auction:

- Queue all orders up to before 09:30
- Store orders in the Order Book into 4 heaps: buy_limit_heap, buy_market_heap, sell_limit_heap, sell_market_heap.
- Run matching algorithm to find matching price. Fulfill all orders at matching price. This order will be the open price
- If no matching price is found or not all orders are filled, pass the Order Book (4 heaps) into Continuous Trading

For close auction, run this algo after 16:00, passing in the Order Book from end of Continuous Trading

OVERVIEW

Continuous Trading:

Maintain the order book as 4 heaps.

Iteratively process each Order in time sequence:

- If Buy, check if can fulfill, update relevant data structures
- If Sell, check if can fulfill, update relevant data structures
- Else, leave order in its respective heap of the data book, process the next order

DESIGN AND ARCHITECTURE

3 Programmes

- Order Validation Engine
- Open/Close Auction Engine
- Continuous Auction Engine

Process to run algorithm:

- Run order validation engine on orders
- Run open/close auction engine on orders
- Run continuous auction engine on output files from 2
- Run open/close auction engine on output files from 3
- Manually combine the output

LEARNINGS AND TAKEAWAYS

- Experience how to simulate a real world trading algorithm, especially under time crunch
- Exposure to work-life and environment in a bank
- Methods could be abstracted better for debugging, unit testing and future additions of criterias
- Beyond this challenge, we enjoyed learning about other divisions of BofA and how Global Markets Technology division with other divisions

THANK YOU!