Pakistan Blockchain Olympiad (PAK-BCOL)

Powered by RNS Solutions & IBCOL

Smart Order Routing

Team Name: *Efficient Logic*

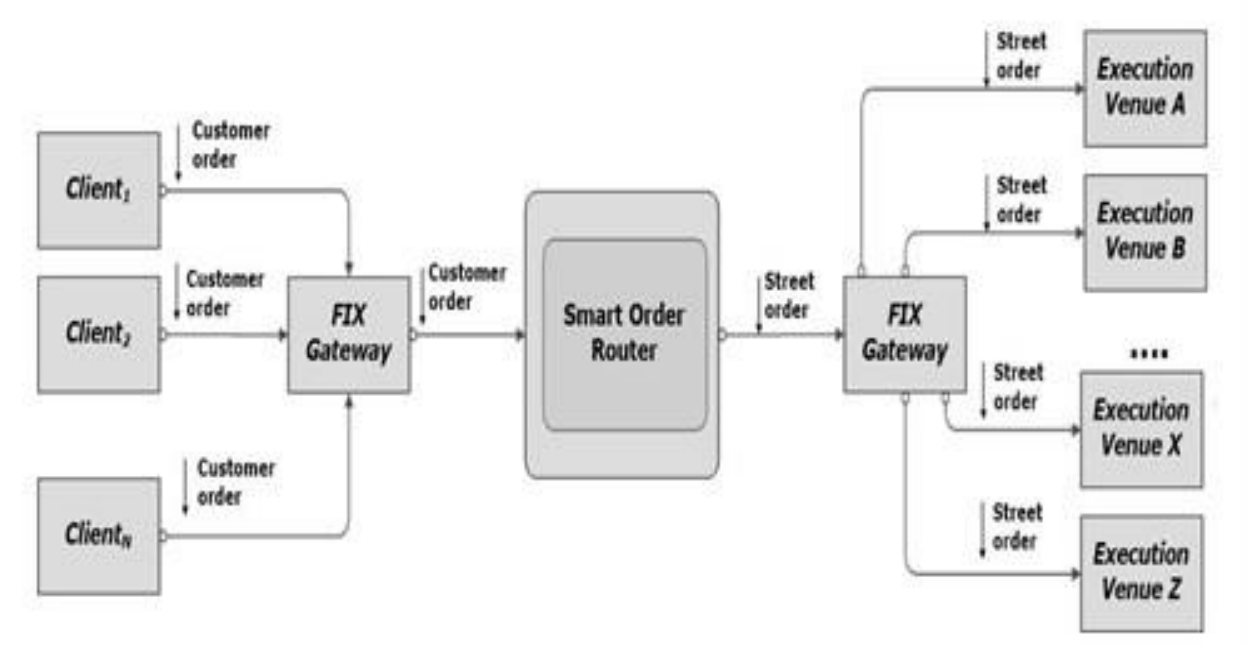
Team Members: Malik Usman Firdous (CIIT/SP16-BCS-029/Wah)

M Umer Aqeel (CIIT/FA16-BCS-005/Wah)

Research And Our Purpose Modules:

(i) Research about SOR

SOR looks for the best price and scouts for this best price by looking at various liquidity destinations. This way, the traders/investors see improvement in profitability of execution.



Various areas where SOR is based on are: Price, Cost, Speed of execution, probability of execution, Size, nature and any other considerations relevant for execution of order.

A Brief Concept

The idea of Smart Order Routing is to scan the markets and find the best place to execute a customer's order, based on price and liquidity

Thus, SOR can involve a few stages:

1. Receiving incoming orders through different channels:

- An incoming FIX gateway;
- An incoming Gateway based on any custom protocol;
- A front-End;

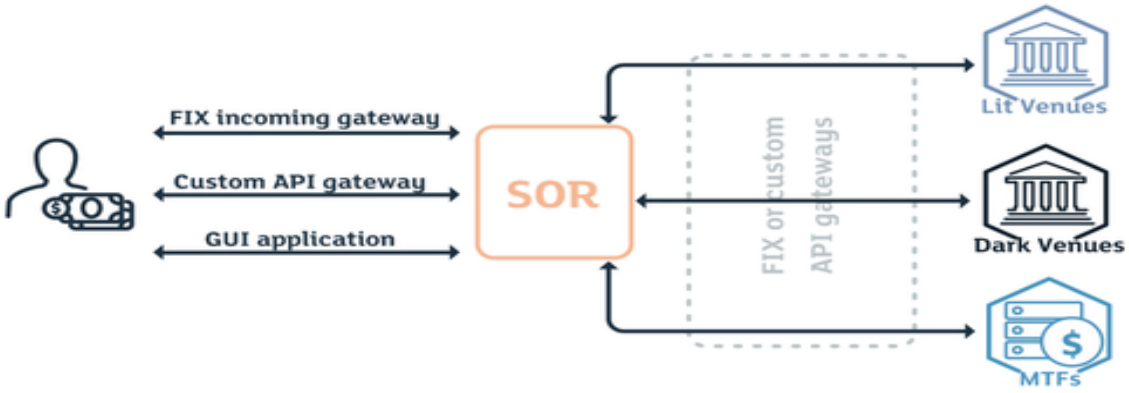
2. Processing the orders inside the SOR system, taking into account:

- Characteristics of available venues;
- Custom algorithms;
- Settings/preferences of a certain client;
- The state of available markets/market data;

Venue parameters, such as average latency, commission, and rank can be used to prioritize certain venues. Custom algorithms, like synthetic orders (peg, iceberg, spraying, TWAP), can be used to manage orders automatically, for instance, if a specific client has certain routing preferences among several brokers, or certain rules for handling of incoming, or creation of outgoing orders. It is also crucial to track the actual venue situation, like the trading phase, as well as the available opportunities. Thus, any Smart Order Router requires real-time market data from different venues. The market data can be obtained either by connecting directly to the venue's feed handlers, or by using market data providers.

3. Routing the orders to one or several venues according to the decision made at step 2 using:

- A FIX gateway;
- A custom API gateway



Routing here does not just imply static routing to a certain venue, but dynamic behavior with updates of existing orders, creation of new ones, sweeping to catch a newly appeared opportunity.

At a closer look, the structure of the SOR system usually contains:

- Client Gateways (to receive incoming orders of the SOR customers);
- Market gateways (to send orders to certain exchanges);
- The SOR implementation (to keep the SOR logic and custom algos and tackle the clients' orders);
- Feed handlers (to provide market data from exchanges, for decision-making);
- Client front-ends (to provide GUI for SOR)

Benefits

SOR provides the following benefits:

- Simultaneous access to several venues;
- Automatic search for the best Price;
- A good framework for usage of custom algorithms;
- Opportunity to get additional validation, control and statistics

Functional description of SOR

Market data check:

SOR considers displayed liquidity from the National Stock Exchange of India (“NSE”) and the Bombay Stock Exchange (“BSE”) market data using direct market data feeds.If the parent order entering SOR (“Parent Order”) is marketable with respect to prevailing displayed liquidity, SOR tries to take quantity from the NSE and BSE, otherwise SOR moves to the Posting phase below. All orders sent from SOR are constrained by the aggregate quantity (never greater) and price (never worse) of the Parent Order.

During the Sweep phase SOR will send immediate or cancel (“IOC”) orders to each destination until Parent Order is filled OR the order is no longer marketable OR until a certain maximum number of IOC orders are sent (sum of orders sent to BSE and NSE), as described below:

1) If a Parent Order or unfilled quantity of the Parent Order is marketable and one of the exchanges has better prevailing price, SOR will take the liquidity on the exchange with the favorable price, by sending an IOC order. a) If the NSE has better prevailing price (best offer for buy / best bid for sell) than BSE, then SOR will send IOC to the NSE for Parent Order/remaining unfilled quantity of Parent Order, in order to take out the best

price level b) If the BSE has better prevailing price (best offer for buy / best bid for sell) than NSE, then SOR will send IOC to the BSE for Parent Order/remaining unfilled quantity of the Parent Order, in order to take out the best price level

2) If the Parent Order is marketable and both exchanges have the same best price, SOR will send IOC orders to both exchanges in a pre-determined ratio at the same best price.

If the maximum number of IOC orders is hit then SOR moves to Posting phase. The maximum number of IOC orders that may be sent, may change from time to time, without notice to the client, on the basis of SOR performance or market conditions.

Posting (Passive order placement)

Unfilled order quantities will be sent to both exchanges in a pre-determined ratio at the limit price of the Parent Order. All posting orders will be DAY orders.

Rebalancing:

In the Posting phase when we split the unfilled quantity to both the exchanges there may be a scenario that we get filled partially on only one of the exchanges. In this scenario the SOR will look to rebalance the remaining unfilled quantity between the exchanges at a predetermined ratio in order to maximize likelihood of execution.

All pre-determined ratios, whether for sweep, posting or rebalancing may be revised from time to time (including intra-day) based on volumes in both exchanges and fill rates, without notice to clients.

The SOR engine will treat the orders on a time priority.

(ii) Our Purpose Modules of SOR

Market-Gateway Module Description:

When comes to market-gateway we cannot sent data to the real stock exchange **(because we have no international account e.g paypal).** We need to connect real time stock market to send our data to certain exchange but in this task we create our own exchange stock market data. Here in Market-gateway when order comes and will process in our created stock data and the process will remain the same as real stock data market the value, profit, loss, high or low amount everything will be work as real scenario.