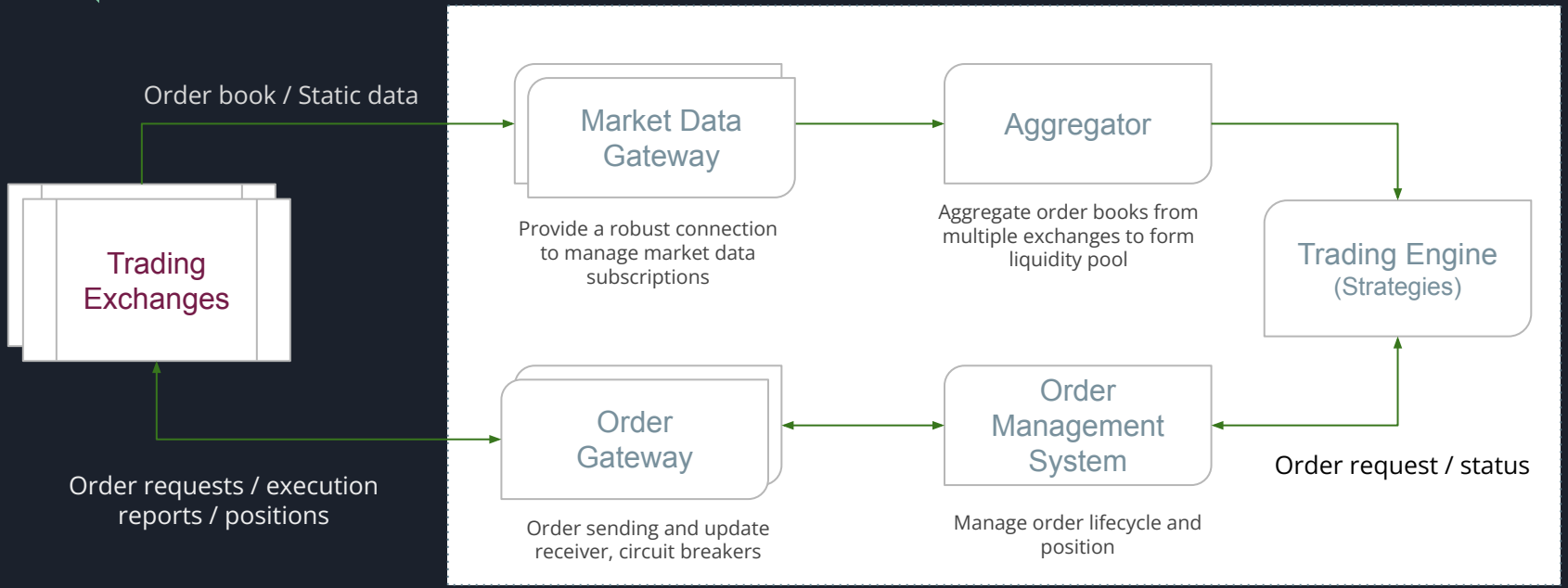
Module 6 - Orders, Positions, Risk Management

MSc in Quantitative Finance (MQF), 2024

Market Data and Order Flow



Order Lifecycle

An order typically go through the following lifecycle:

- Created - order created by strategy, before submission to OMS
- Pending new - order exists in OMS, before submission to exchange
- New - order is submitted to exchange
- Confirmed - order is confirmed by exchange
- Partially filled - order is partially filled
- Filled - order is fully filled
- Pending cancel - cancellation request is submitted to exchange
- Canceled - order is canceled by exchange
- Rejected - order is rejected by exchange
- Expired - order is cancelled by exchange due to time-in-force instruction

Positions Management

A trading strategy requires a robust mechanism to keep an accurate record of current positions for risk management (e.g. to stay within trading limits, stop-loss triggers) and position sizing (i.e. how much to trade when initiating a new order):

- Realized vs open positions
- Long vs short positions
- Average filled price, mark price, liquidation price
- Unit of positions (contracts, notional, underlying, greeks)
- Cost of carry

Risk Management

Depending on which asset classes are traded, strategies are exposed to different sources and levels of risk. Risk is a critical topic in trading, and require immense effort to implement for those who want to monitor their algorithmic trading system in real-time. Key risks are:

- Investment risk
- Market risk
  - Equity market risk
  - Interest rate risk
  - Currency/FX risk
  - Option risk (delta, gamma, theta, vegga)
  - Commodity market risk
  - Credit risk
  - Algorithmic risk
- Leverage risk
- Operational risk
- Technology risk
- Regulatory and compliance risk

Basic Risk Measures

Risk is inherent in trading and is a core component in the design of trading decision. Risk is a quantitative measure of potential financial losses and there are some basic metrics that exists in most trading system to support decision logic:

- Open positions
- Profit-n-Loss (PnL)
- Maximum drawdown
- Volatility - variance and standard deviation
- Value-at-risk (VaR)
- Margin-ratio

Circuit Breakers

Circuit breakers are simple “mechanical” controls that can automatically halt a trading system from generating more orders when malfunctions or potential flaws are detected. Circuit breaker works by monitoring key metrics of trading activities to keep the measures within upper limits, for example:

- Single order max notional
- Max order generation rates
- Max notional of open orders
- Max active orders

Classroom exercises: week_06

- Real-time subscription to market depth stream
- Real-time subscription to order execution stream
- Callback concept
- A simple trading gateway