QC Algorithm Framework

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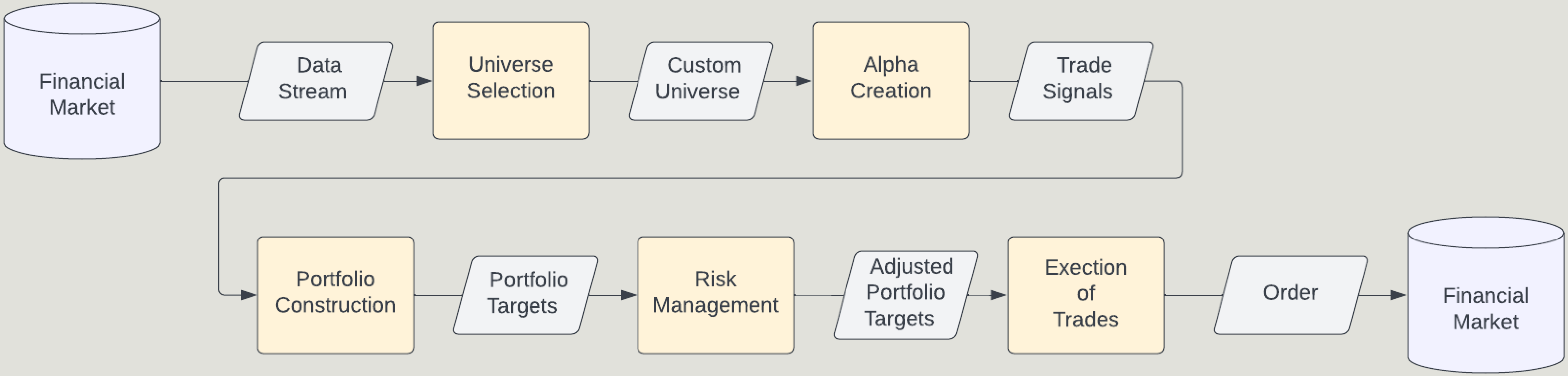
Overview of Financial Trade

QuantConnect (QC) Algorithm Framework



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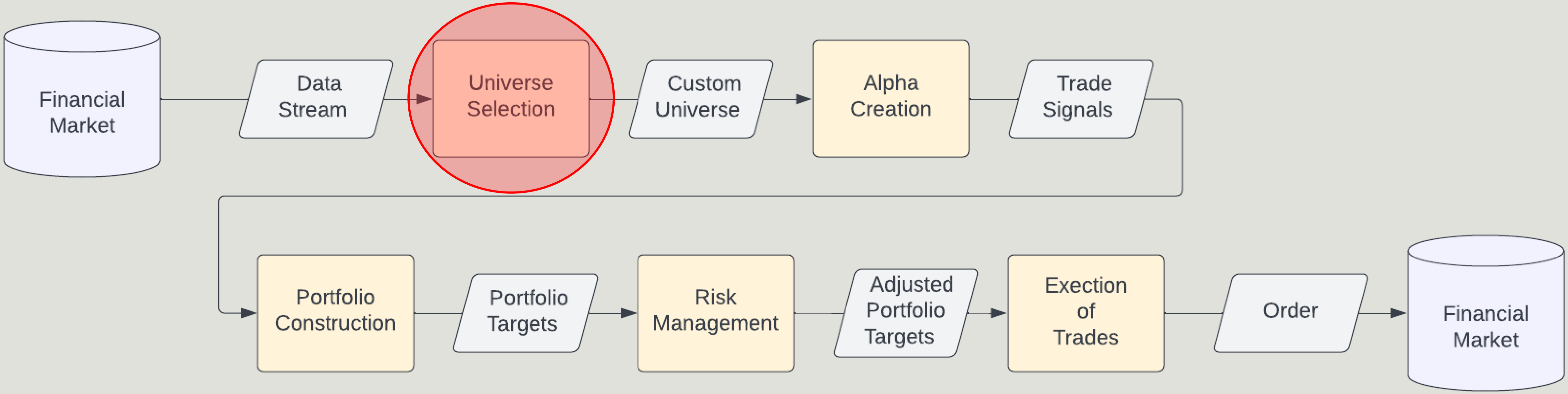

Universe Selection

- Select the assets for our strategy.
- Human selected universe contains undesirable biases.
  - Use Universe Models to programmatically select assets to avoid selection bias.
- Universe Models take in universe data and return a list of symbol objects.

Universe Selection

- QC provides dozens of premade universes:
  - Manual Selection
    - Static selection of assets
  - Fundamental Selection
    - Selection based on coarse price, or fundamental data
  - Scheduled Selection
    - Selection occurs on regular intervals

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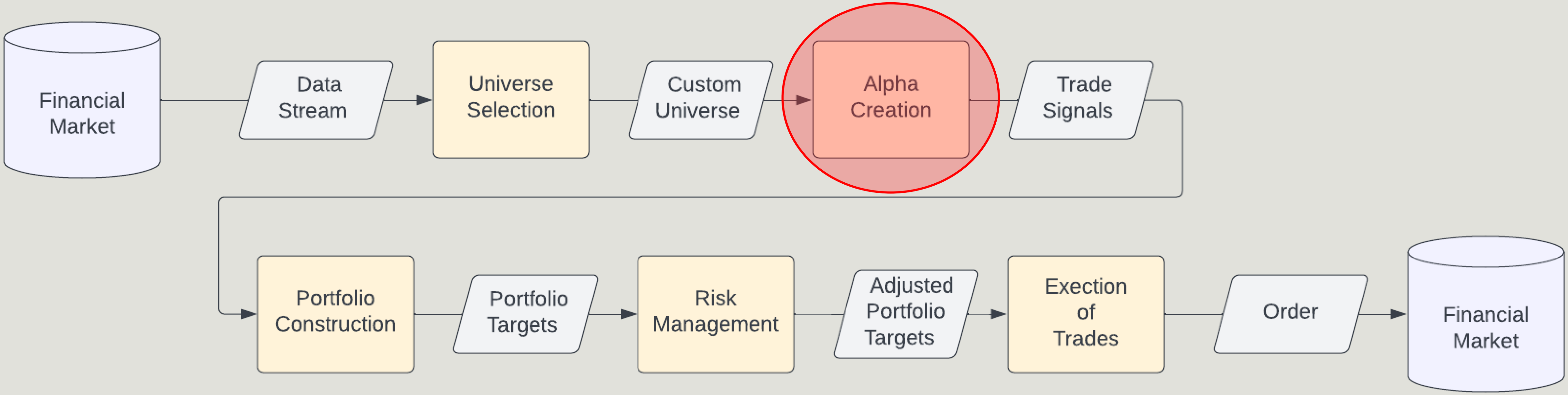

Alpha Creation

- Generate trade signals (when to make an investment)
- Human generated trade signals are risky
  - Alpha models generate prediction on assets in our universe
  - Signals contain (1) direction (2) magnitude, and (3) confidence of a market prediction

Alpha Creation

- Alpha Models can be:
  - TraderCompany’s existing algorithms
    - Decision Tree Ensembles
    - Gradient Boosted Trees
  - Expert-crafted strategies
  - Deep Learning models

Alpha Creation

- How to deploy our trained models?
  - QC has a permanent project-specific storage location called *object store*
  - Trained models can be stored into *object store* and accessible during backtesting and live
  - For PyTorch, save models as pickle (detail)
- Storage Limits?
  - Free and Quant Researcher Plan: capped
  - Team plan and above: expandable

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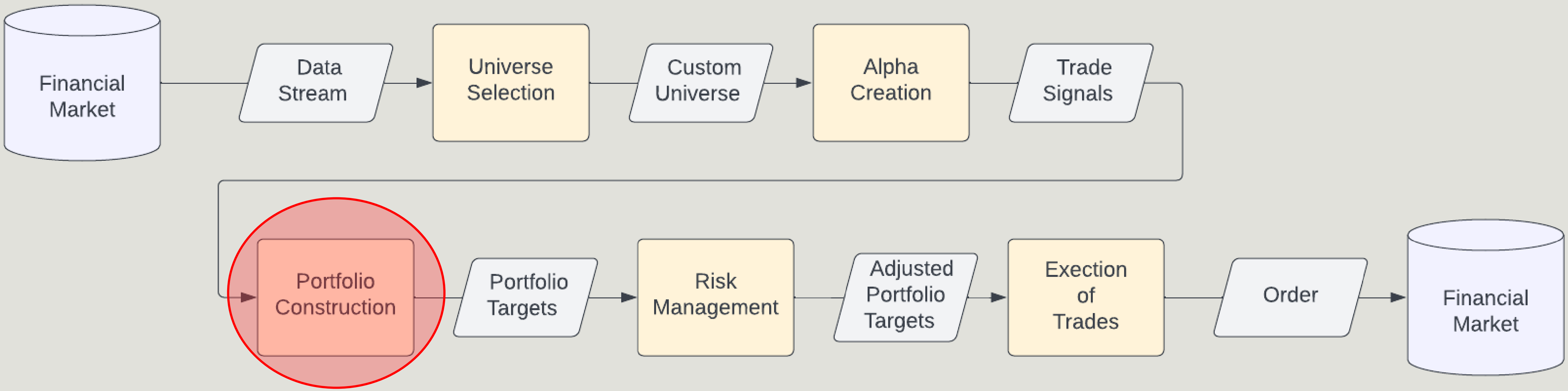

Portfolio Construction

- Convert signals into Portfolio Targets

- Portfolio Targets hold a share quantity to hold
  - In other words, “how much should I buy based on the signals from alpha models?”

- Portfolio Construction Models optimize the allocation of resources for best return.

Portfolio Construction

- Portfolio Construction Models:
  - Equal Weighting Portfolio Construction
    - Simple model that assigns an equal share of the portfolio to assets
  - Mean Variance Portfolio Construction
    - Tries to build a portfolio with the min. volatility possible
  - Black Litterman Portfolio Construction
    - Tries to optimize asset allocation within an investor's risk tolerance and market view (detail)
  - Null Portfolio Construction
    - Skip the execution phase. Thus, favorable when analyzing the new alpha model alone.

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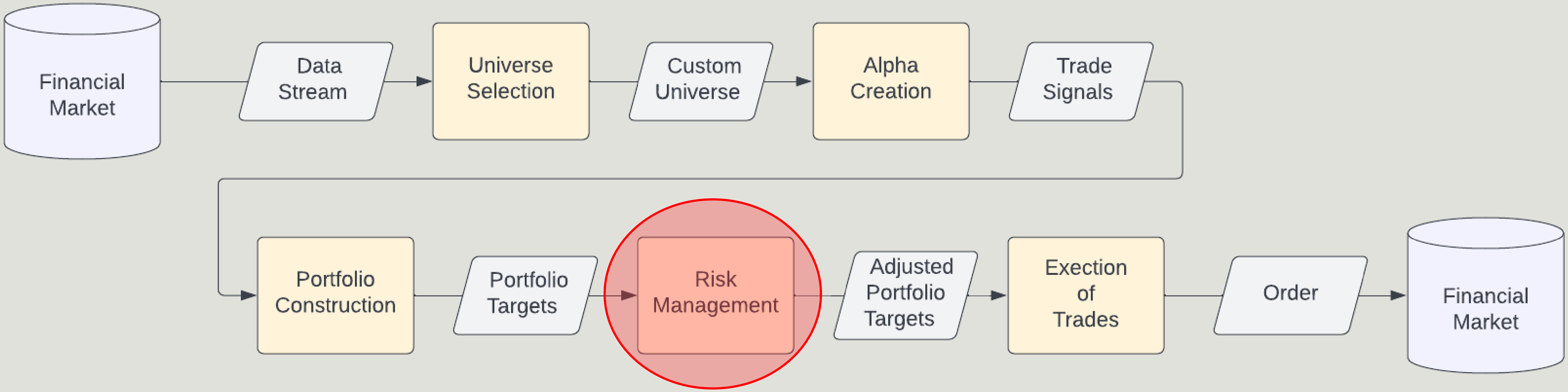

Risk Management

- Sometimes the portfolio targets can be risky.
- Ensure our targets are within safe risk parameters.
- Adjust the portfolio targets dynamically to manage risks.

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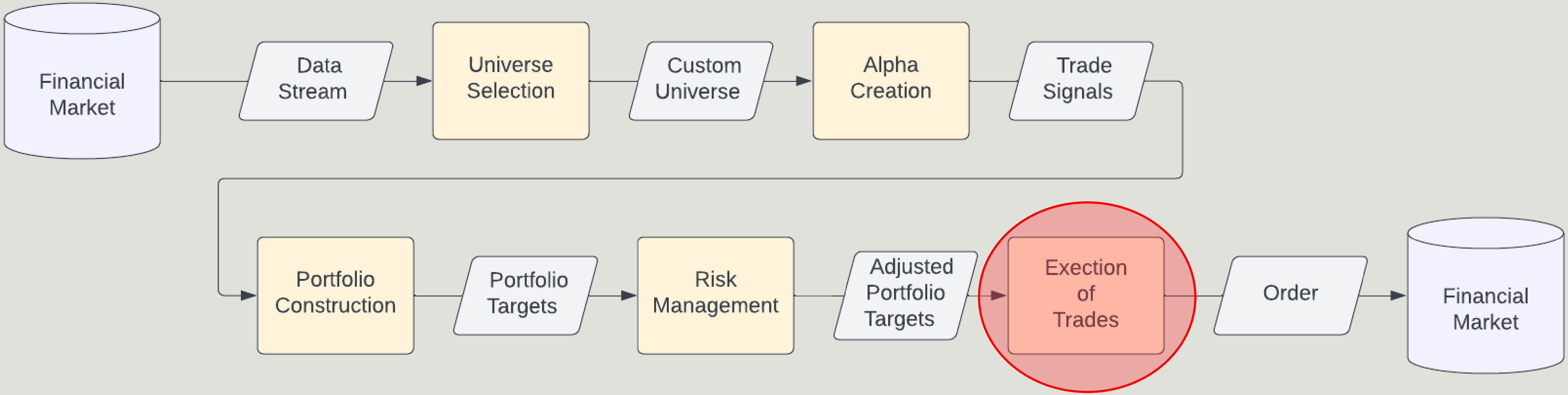

Execution of Trades

- Execution Models try to reach the portfolio target as efficiently as possible.
  - Efficient in terms of time and price.
- Execution Models can break up orders and fill trades if necessary.
- The model is free to delay or spread out the fulfillment of orders as it sees fit.

Thank you