



Level 3 Order Book Pipelines

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Talk Overview

- What is a central limit order book
- Ingesting data from an exchange
- Processing the ingested data with Beam



Crypto Exchanges

- Trusted counterparty
- Exchange cryptocurrencies to USD and back.
- Price-time priority order book to match buyers with sellers.
- FIFO queue of order sizes at each price level.

BEAM-USD Order Book

Asks ↑	\$103	15 BEAM
	\$102	5 BEAM
	\$101	1 BEAM
Bids ↓		
	\$99	3 BEAM
	\$98	13 BEAM
	\$97	22 BEAM

Central Limit Order Book



Level 3 Order Book Snapshot

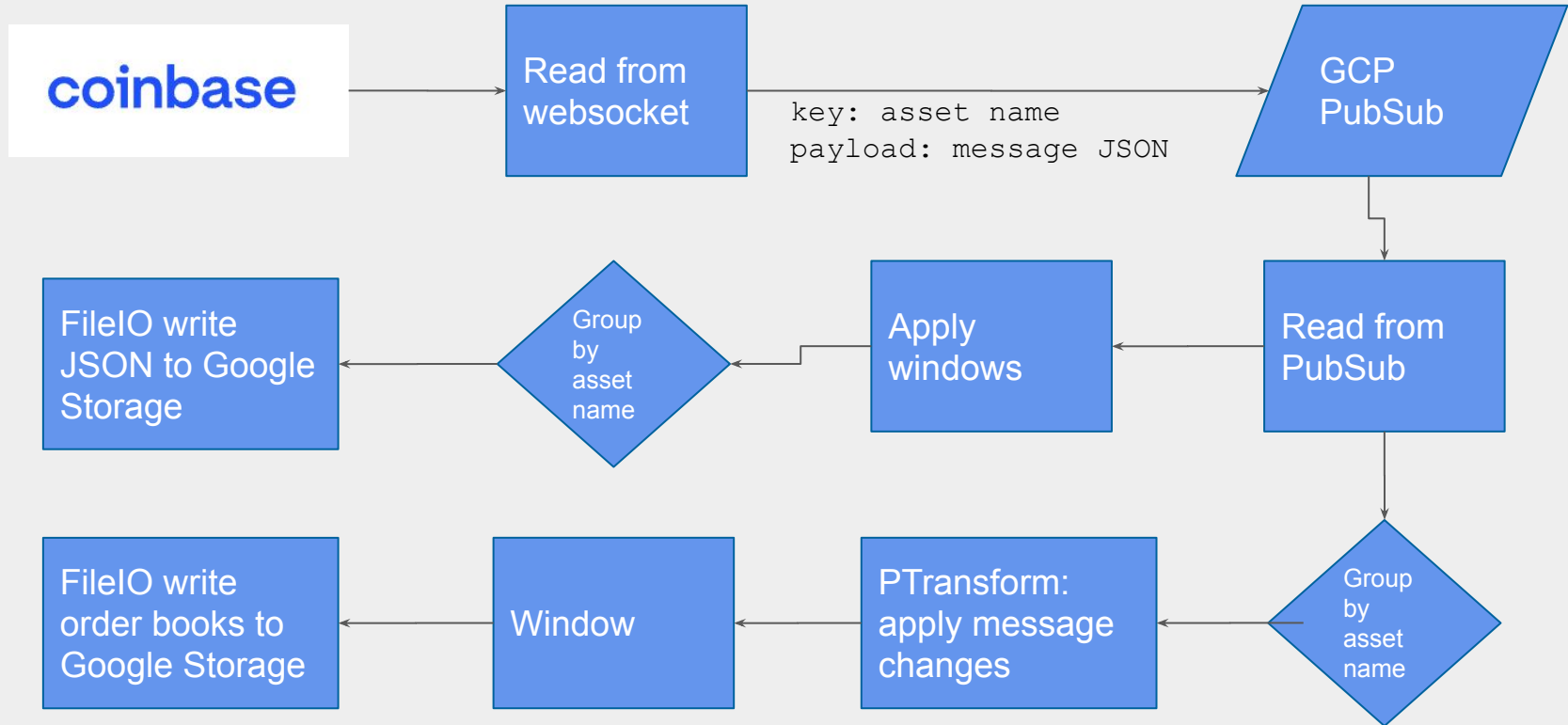
```
{
  "bids": [
    [
      "39733.91",
      "1",
      "95dd1e2c-8bf0-45ee-9cee-a990742817e0"
    ],
    [
      "39733",
      "0.05071409",
      "754d152c-123f-4419-8c05-21591bf61274"
    ],
    [
      "39732.99",
      "0.29",
      "e84582ef-b067-4274-b7ed-8c4155fb982a"
    ],
    [
      "39732.89",
      "1",
      "21013671-32fe-41cb-bd2b-23c9a1fd22c7"
    ],
    [
      "39731.52",
      "0.04585183",
      "32140f85-e679-4906-8c5d-be5491e54bb7"
    ]
  ]
}
```

WebSocket Feed

OPEN, DONE, MATCH, RECEIVED

```
{
  "type": "received",
  "time": "2021-08-02T08:19:27.028459Z",
  "product_id": "BTC-USD",
  "sequence": 10,
  "order_id": "d50ec984-77a8-66f114b0de9b",
  "size": "1.34",
  "price": "39669.1",
  "side": "buy",
  "order_type": "limit"
}
```

A Beam Pipeline (GCP Dataflow)



Scaling up on GCP

- Deployed to Google Cloud Dataflow
- Pipeline is processing over 100 unique keys (asset names) in parallel
- Overall we handle 5-10 billion messages per week



What are we working on?

- Multiple Apache Beam pipelines for trade data, order book data, and derivatives data.
- Custom PTransforms - format for DS

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