Apache Flink:
The Latest and Greatest

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Original creators of **Apache Flink®**

Providers of the **dA Platform**, a supported Flink distribution

The Latest Features

- ProcessFunction API

- Queryable State API

- Excellent support for advanced applications that are:

  - Flexible
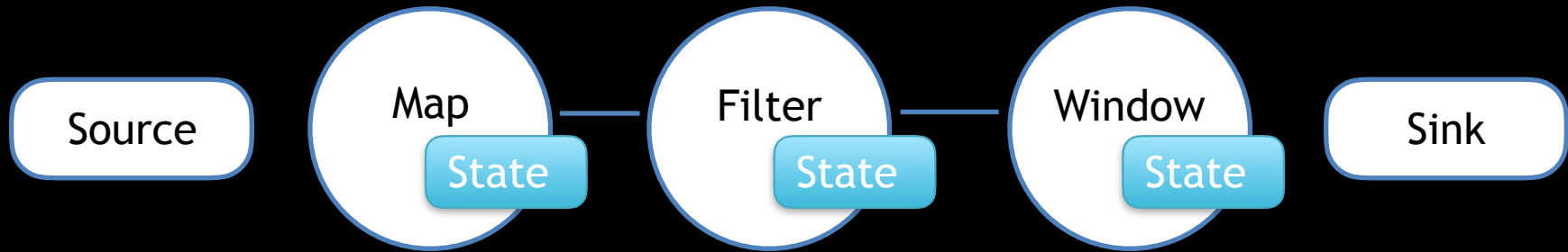
  - Stateful

  - Event Driven

  - Time Driven

The Latest Features - Quick Overview

- Rescalable State

- Async I/O Support

- Flexible Deployment Options

- Enhanced Security
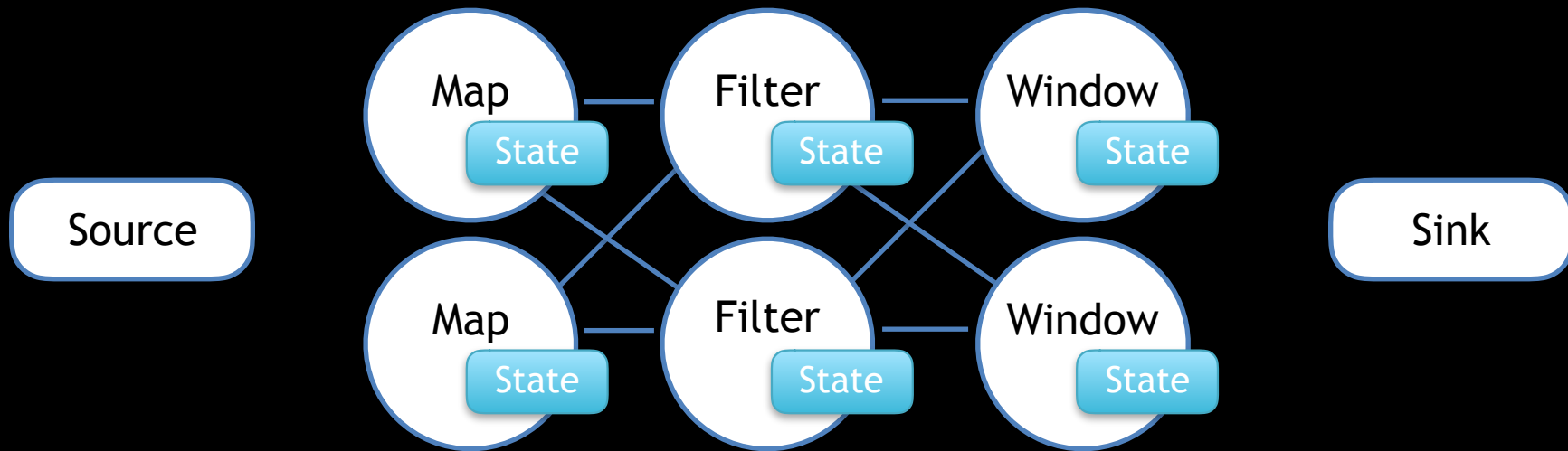
Rescalable State

- Separates state parallelism from task parallelism

- Enables autoscaling integrations while maintaining stateful computations

- Handled efficiently via key groups
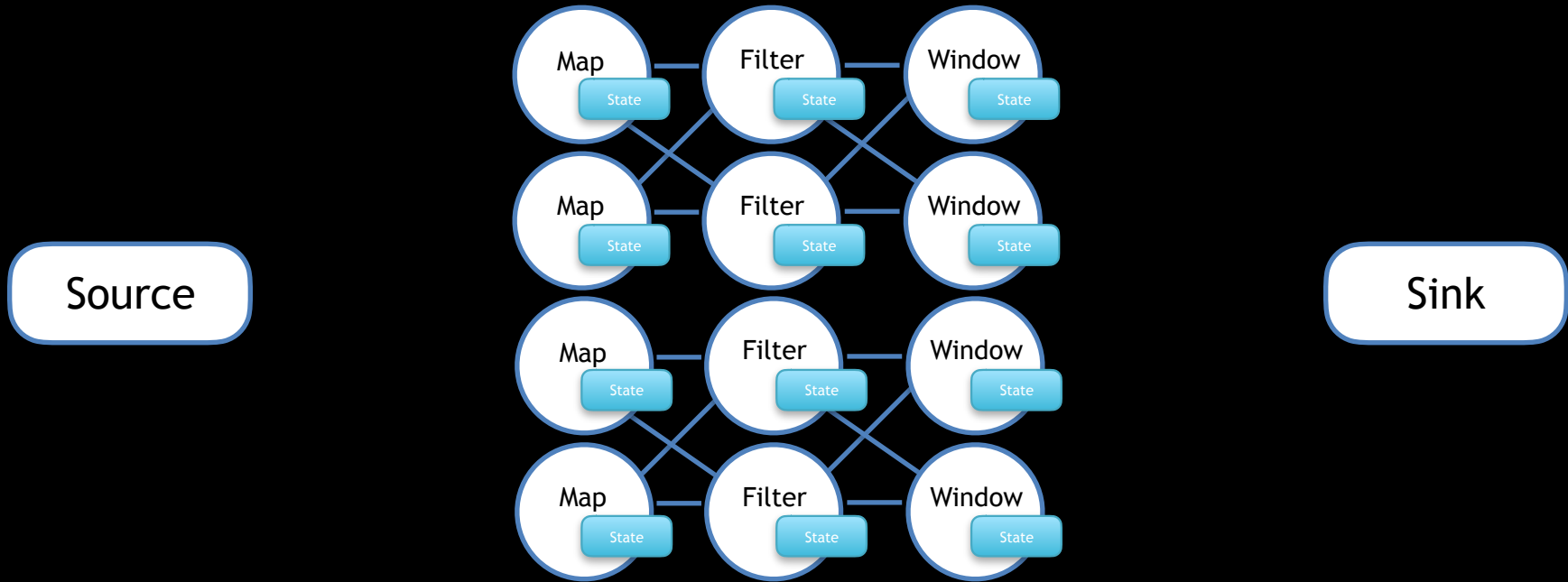
Rescalable State
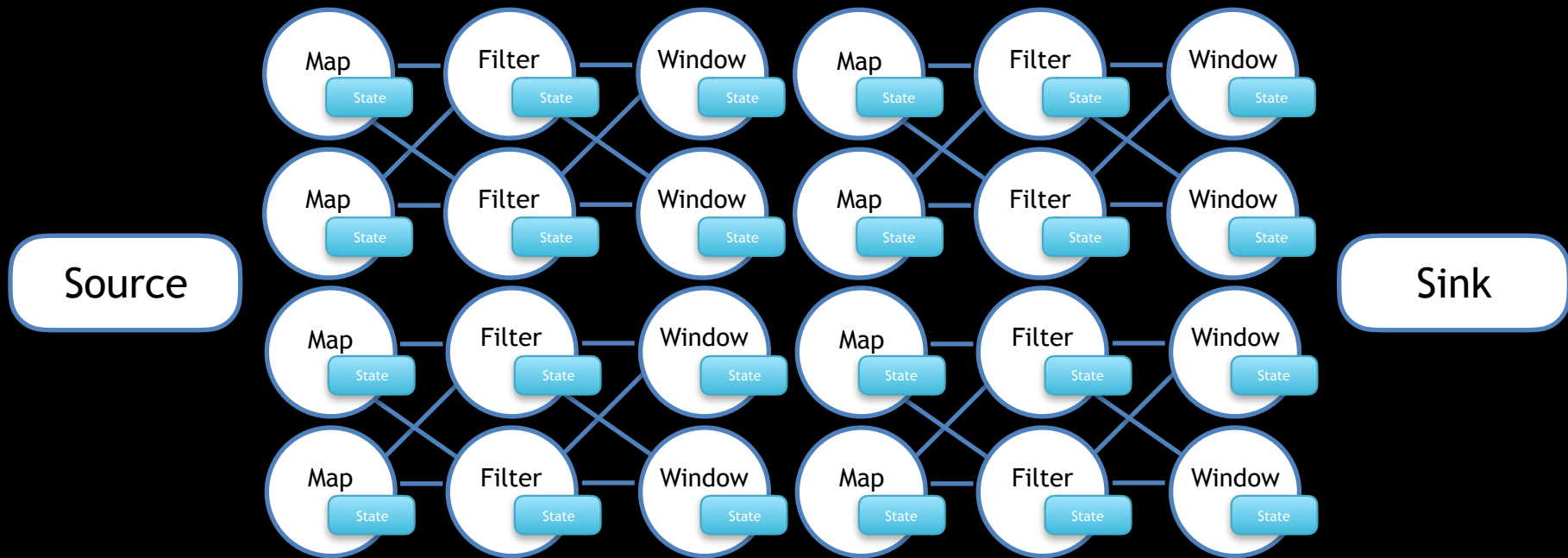

State is partitioned by key

Rescalable State

State is partitioned by key

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Rescalable State

State is partitioned by key

Flexible Deployment Options

- YARN

- Mesos

- Docker Swarm

- Kubernetes

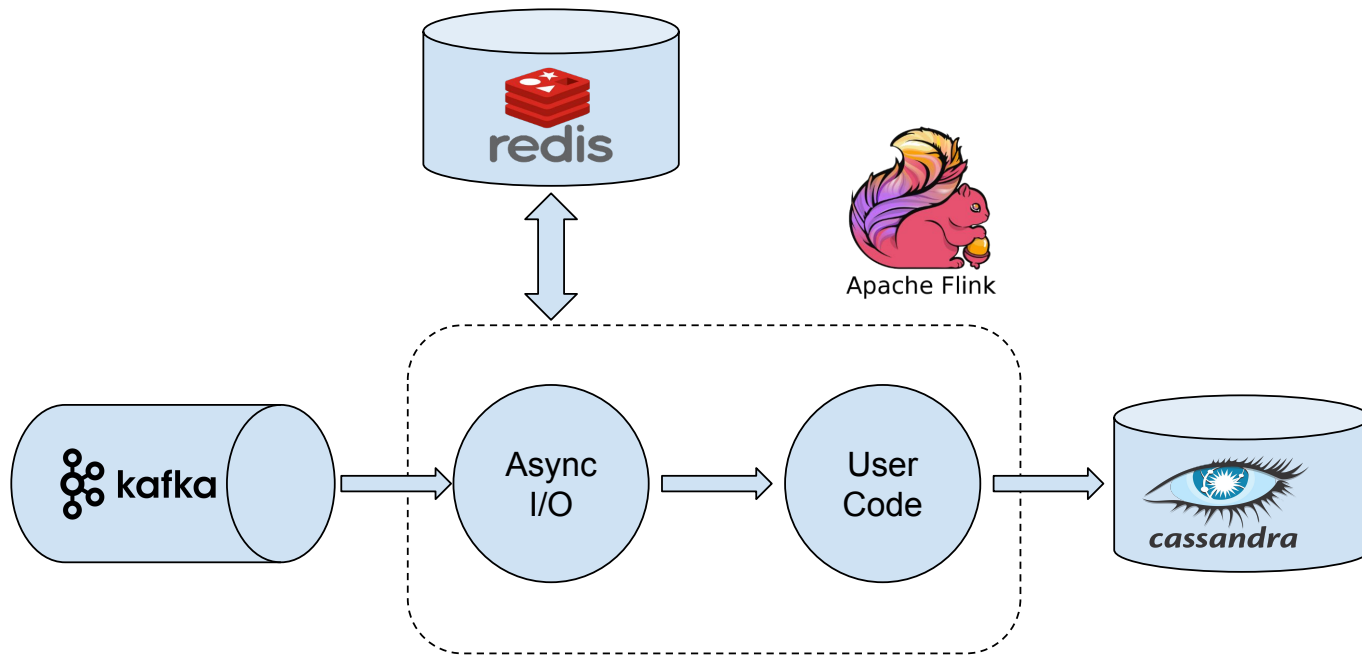# Flexible Deployment Options

- DC/OS

- Amazon EMR

- Google Dataproc

Asynchronous I/O Support

- Make aynchronous calls to external services from streaming job

- Efficiently keeps configurable number of asynchronous calls in flight

- Correctly handles failure scenarios - restarts failed async calls, etc
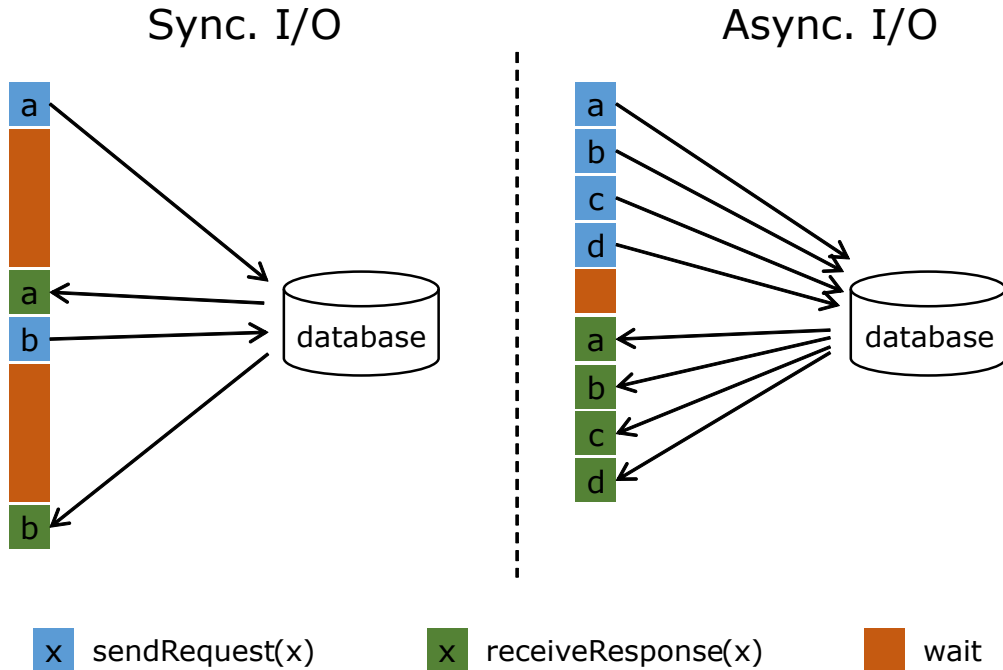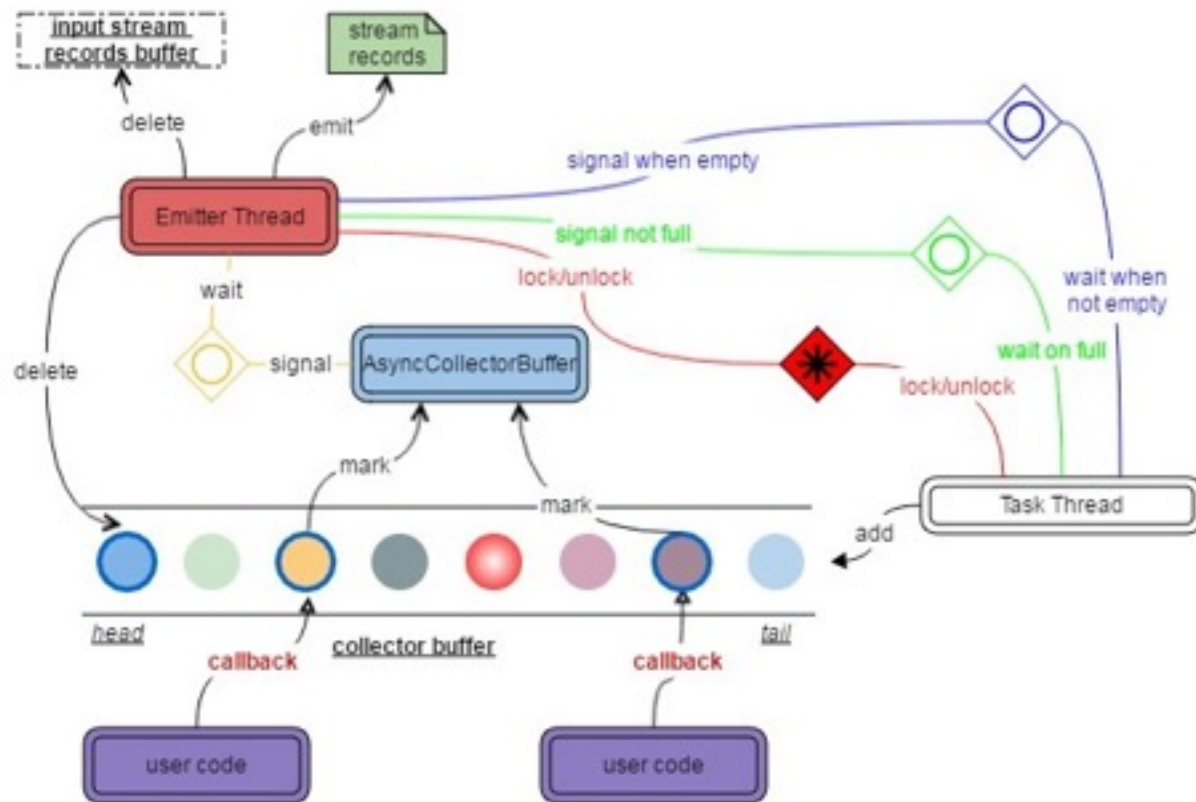
Asynchronous I/O Support

Asynchronous I/O Support

Little's Law:

throughput = occupancy / latency

Asynchronous I/O Support

Sync. I/O

Async. I/O

x sendRequest(x)   x receiveResponse(x)   ☐ wait

Asynchronous I/O Support

Asynchronous I/O Support

```scala
// create the original stream
val stream: DataStream[String] = ...

// apply the async I/O transformation
val resultStream: DataStream[(String, String)] =

  AsyncDataStream.unorderedWait(
    input = stream,
    asyncFunction = new AsyncDatabaseRequest(),
    timeout = 1000,
    timeUnit = TimeUnit.MILLISECONDS,
    concurrentRequests = 100)
```

Asynchronous I/O Support

```scala
class AsyncDatabaseRequest extends AsyncFunction[String, (String, String)] {

    override def asyncInvoke(str: String, asyncCollector: AsyncCollector[(String, String)]): Unit = {

        // issue the asynchronous request, receive a future for the result
        val resultFuture: Future[String] = client.query(str)

        // set the callback to be executed once the request by the client is complete
        // the callback simply forwards the result to the collector
        resultFuture.onSuccess {
            case result: String => asyncCollector.collect(Iterable((str, result)));
        }
    }
}
```

Enhanced Security

- SSL
- Kerberos
  - Kafka
  - Zookeeper
  - Hadoop

Advanced Event-Driven Applications

- ProcessFunction API

- Queryable State API

- Excellent support for advanced applications that are:

  - Flexible

  - Stateful

  - Event Driven

  - Time Driven

Example: FlinkTrade

- Overall Requirements:
    - Consume "starting position" and "quote" streams
    - Process complex, time-oriented, trading rules
    - Trade out of positions to our advantage if possible
    - Provide a dashboard of currently held positions to traders and asset managers

- Complex Rules:
    - We only make trades where the Bid Price is above our current Ask Price
    - When a trade is made we increase our Ask Price — looking to optimize our profits
    - Positions have a set time-to-live until we try to trade out of them more aggressively by decreasing the Ask Price over time
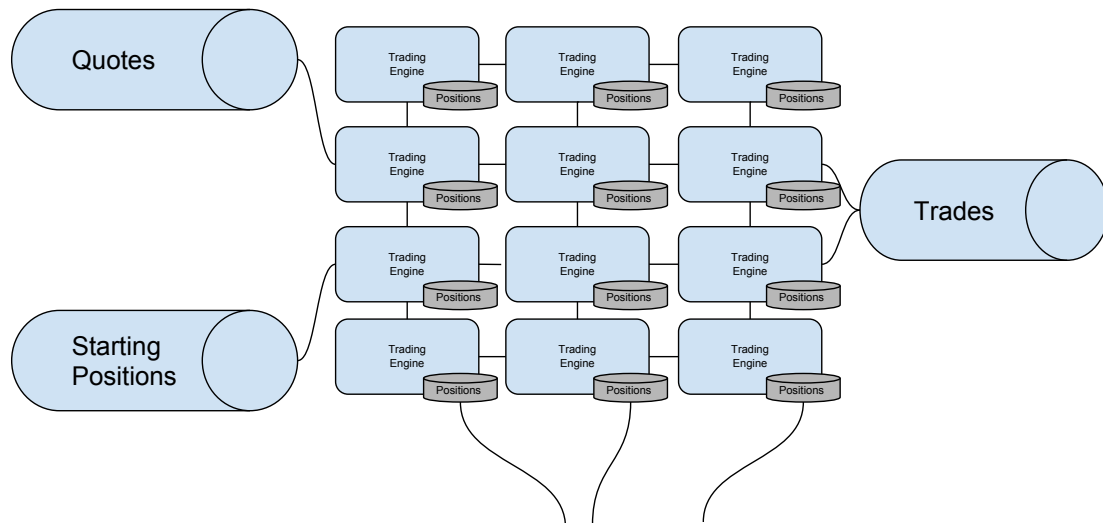
Example: FlinkTrade

- Event Driven Processing
- Complex Trading Rules
- Time Based Logic

Quotes

Starting Positions

Trading Engine

Positions
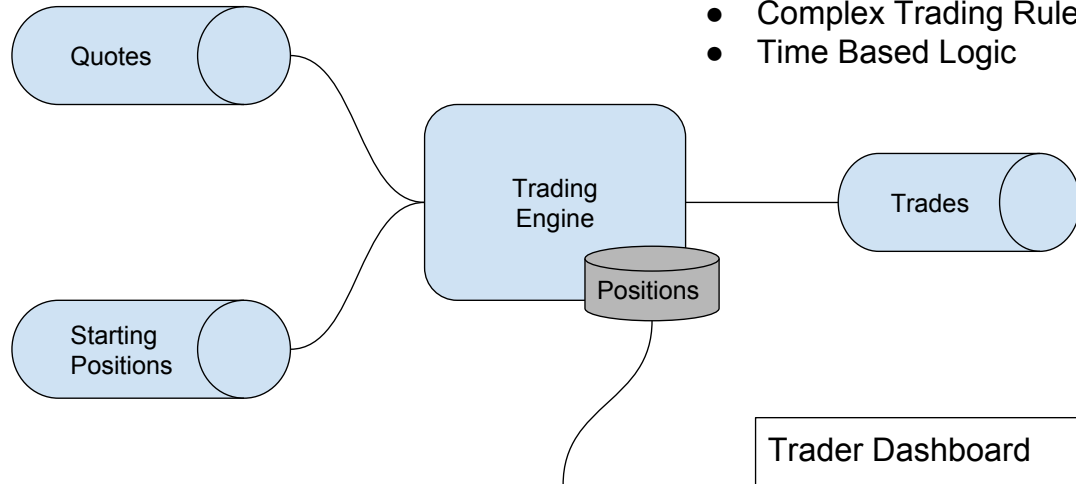
Trades

Trader Dashboard					
SYMBOL	SHARES	BUY PRICE	ASK PRICE	LAST TRADE PRICE	Profit
AAPL	10,000	140.40	140.50	140.40	$10,921.00
GOOG	20,000	846.81	846.91	846.81	$12,021.00
TWTR	8,000	15.12	15.22	15.12	$4,032.00

Example: FlinkTrade

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Example: FlinkTrade

Let's look at the code

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