Apache Flink:
The Latest and Greatest

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dA
PLATFORM

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

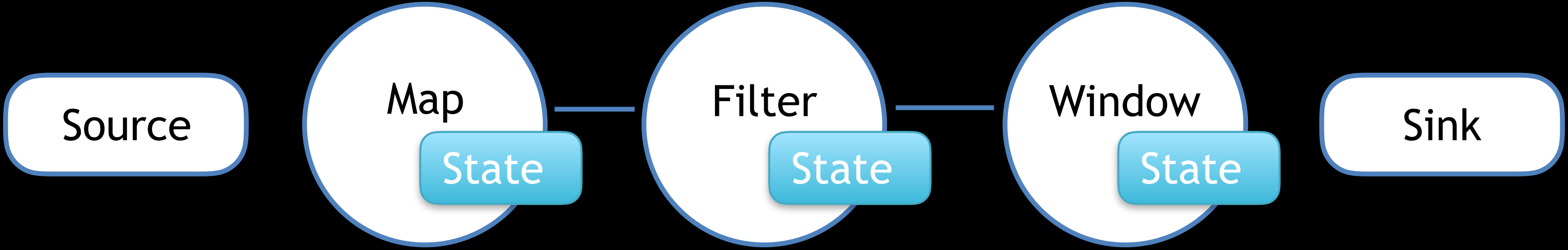
The Latest Features - Quick Overview

- Rescalable State
- Async I/O Support
- Flexible Deployment Options
- Enhanced Security

Rescalable State

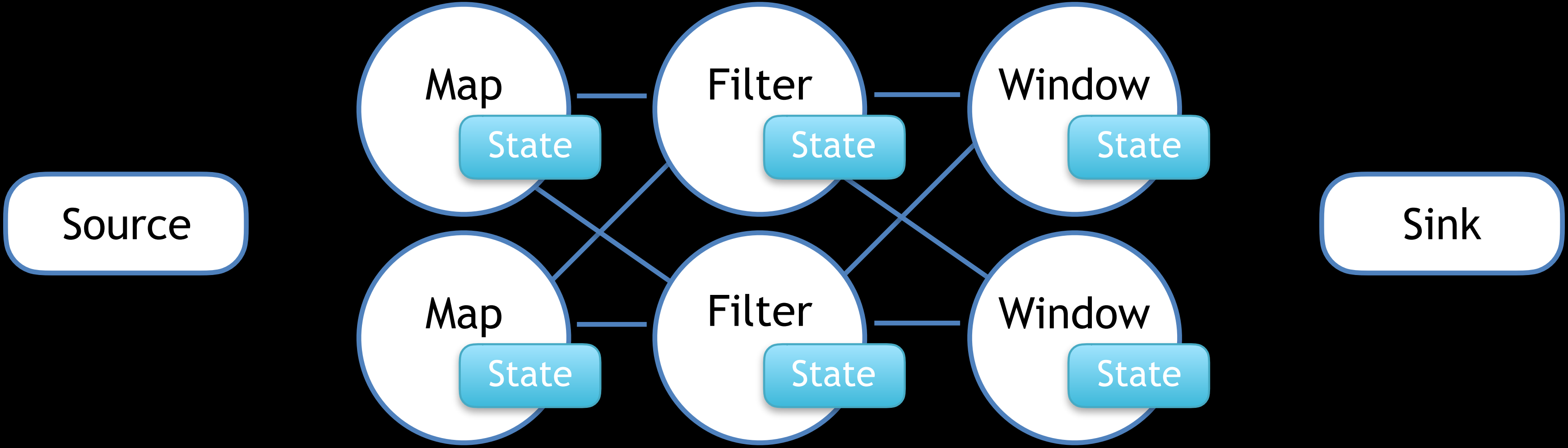
- Separates state parallelism from task parallelism
- Enables autoscaling integrations while maintaining stateful computations
- Handled efficiently via key groups

Rescalable State



State is partitioned by key

Rescalable State



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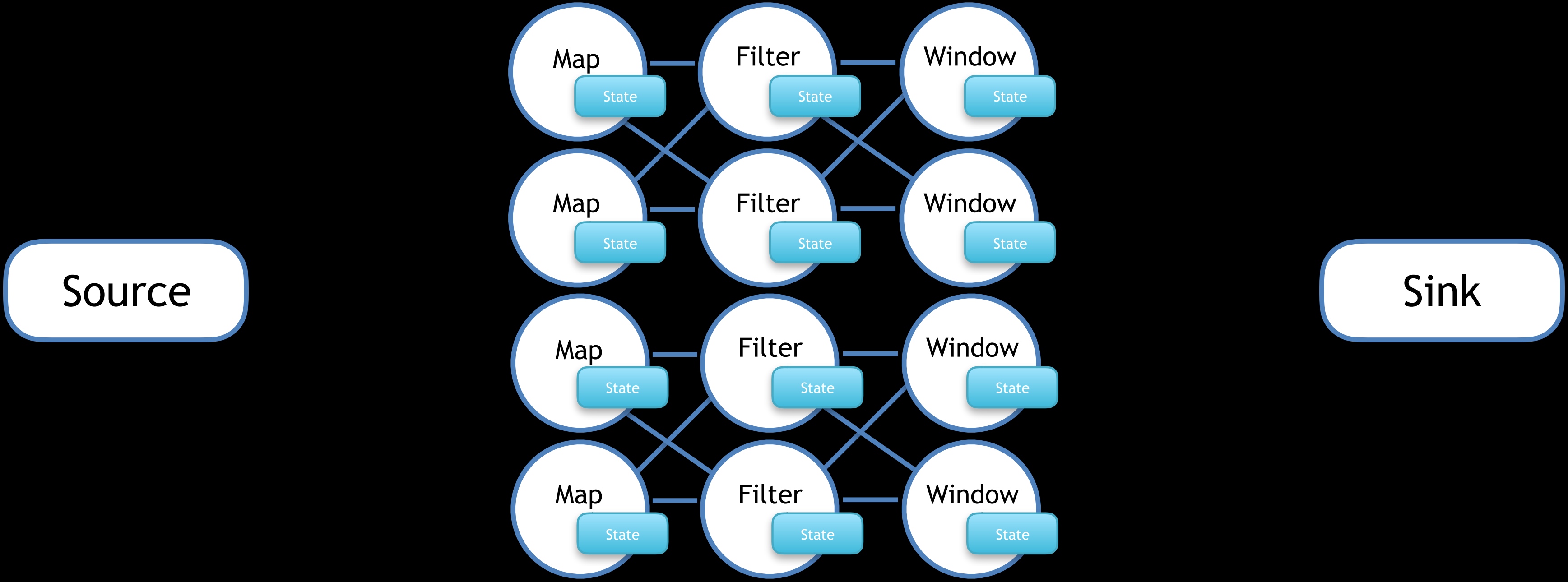

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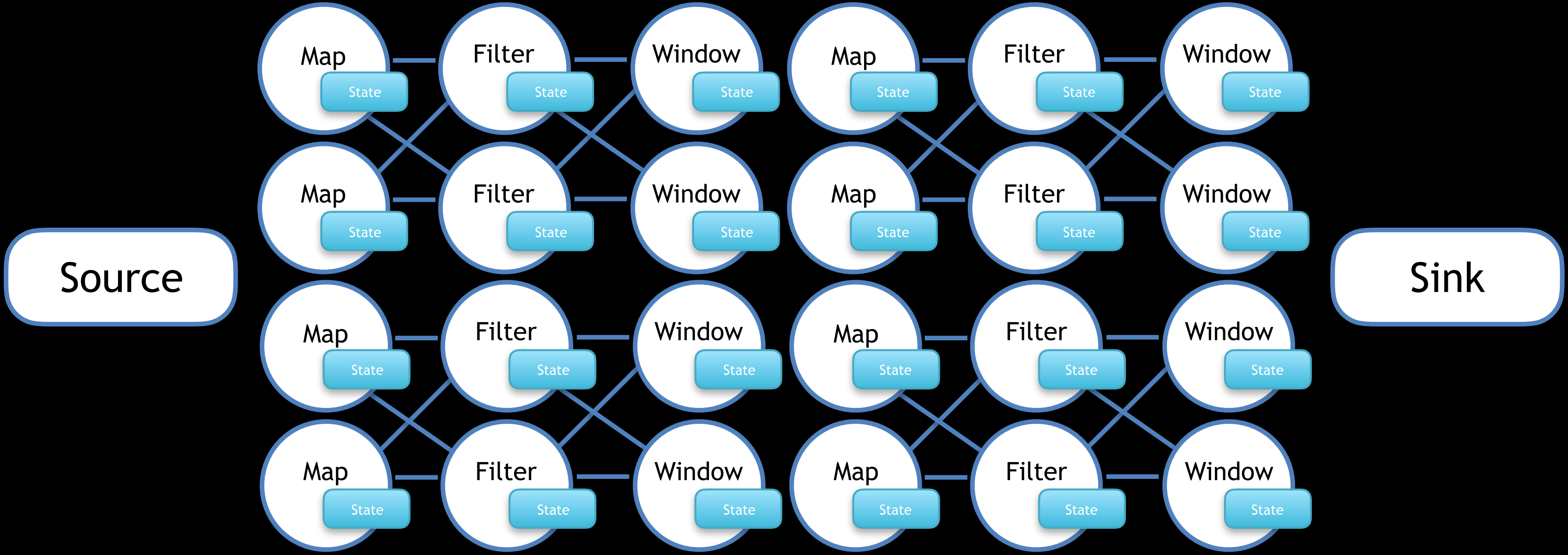
Rescalable State



State is partitioned by key

Flexible Deployment Options

- YARN
- Mesos
- Docker Swarm
- Kubernetes

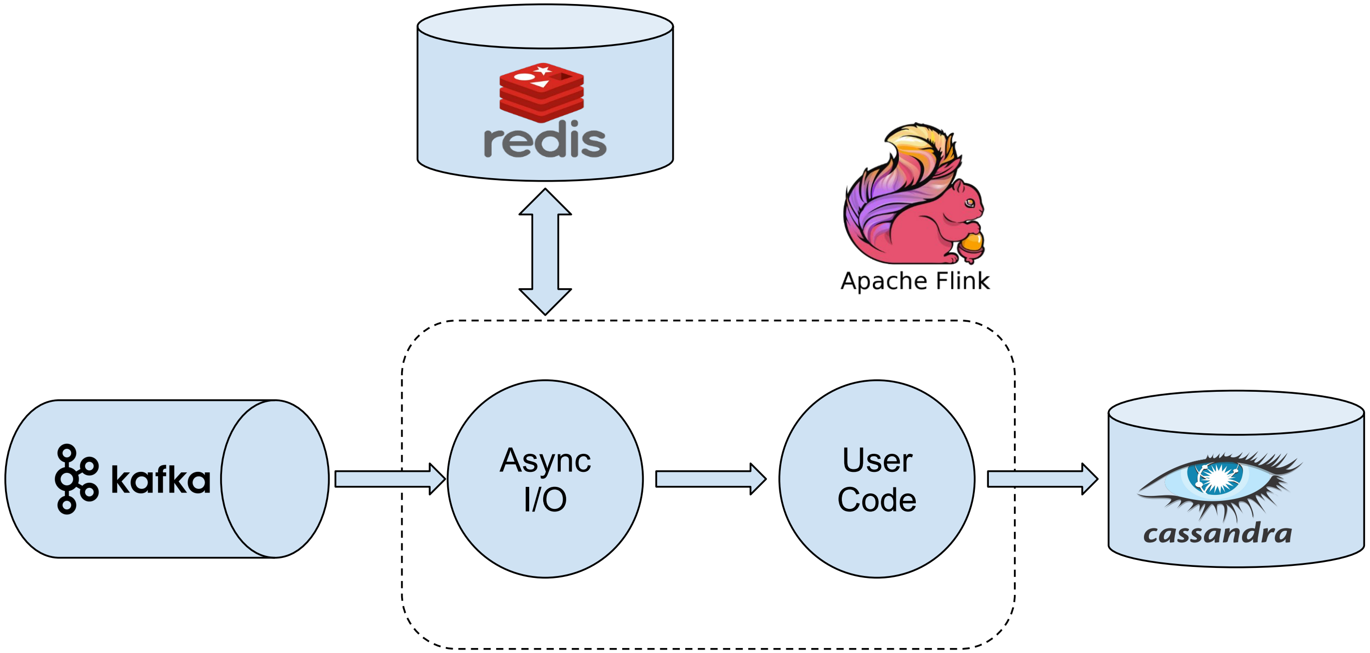
Flexible Deployment Options

- 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

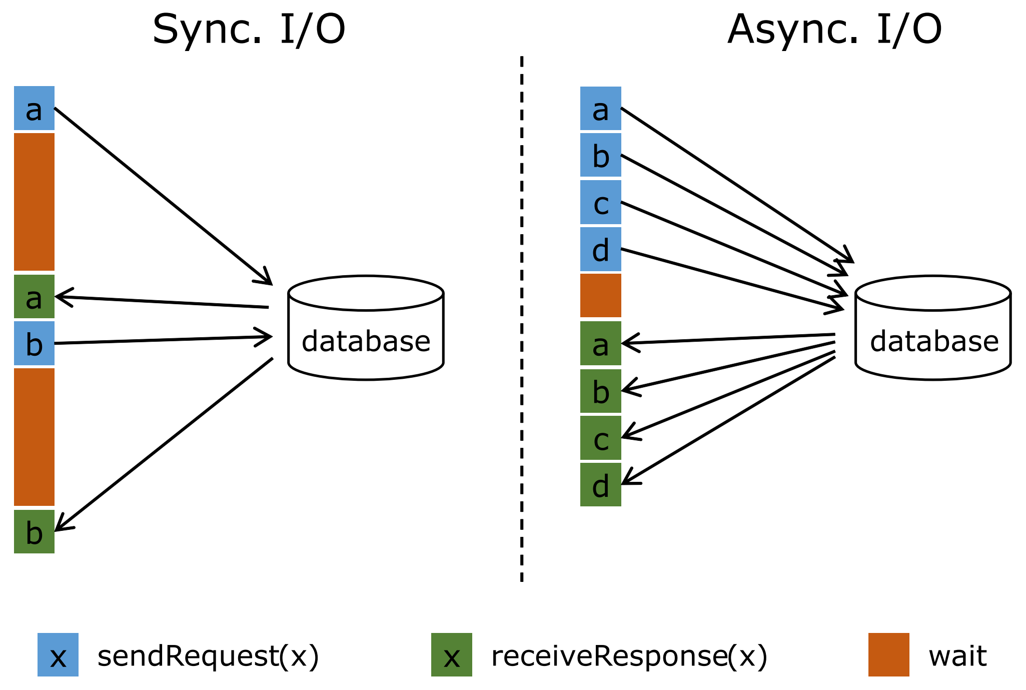


Asynchronous I/O Support

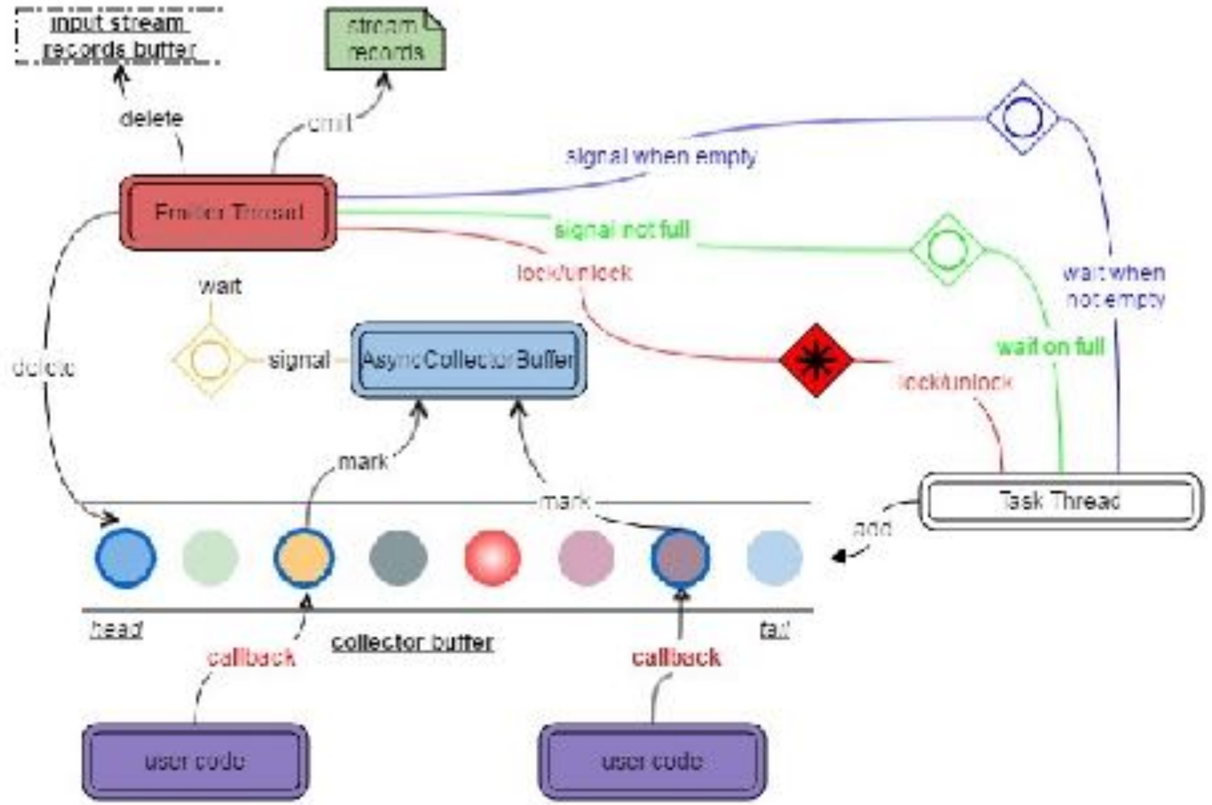
Little's Law:

throughput = occupancy / latency

Asynchronous I/O Support



Asynchronous I/O Support



Asynchronous I/O Support

```
// 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

```
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

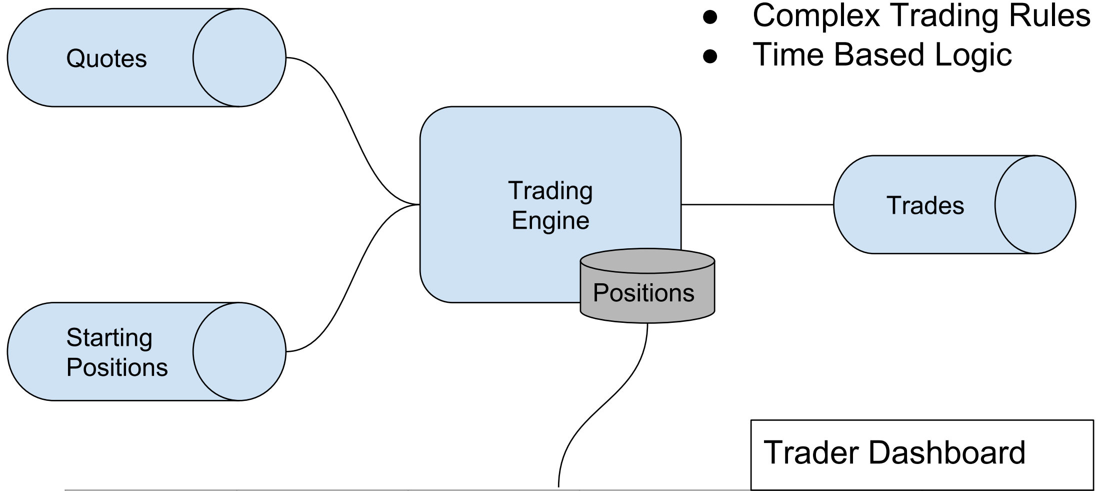
Example: FlinkTrade

- 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

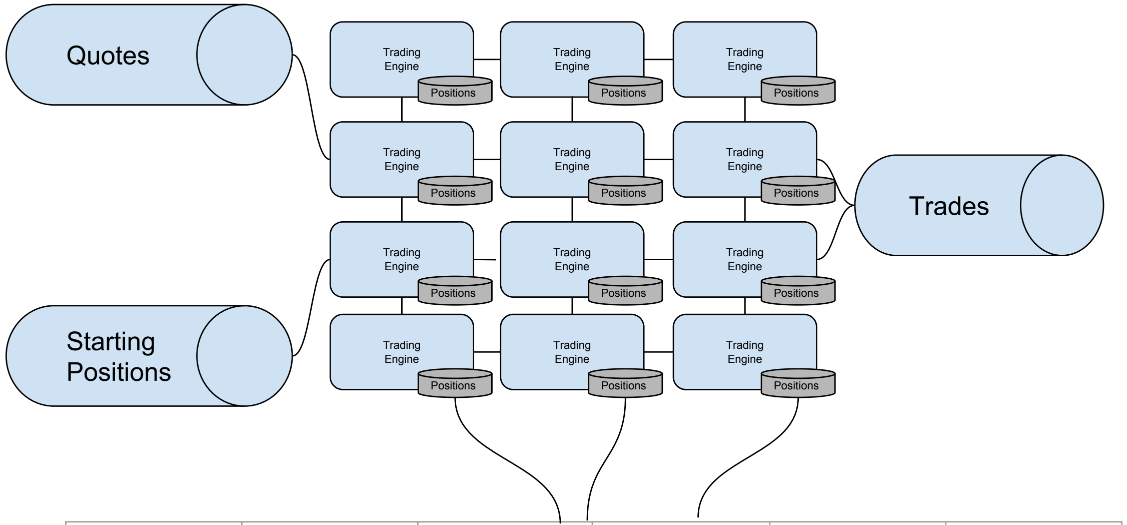
- Event Driven Processing
- Complex Trading Rules
- Time Based Logic



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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