
Cassandra
and
Spark
@tlberglund


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Spark
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Cassandra

What:

- Distributed database
- Transactional/online
- Low latency, high velocity

When?

- You have too much data
- It changes a lot
- The system is always on

Data Model

```
CREATE TABLE credit_card_transactions(
  card_number VARCHAR,
  transaction_time TIMESTAMP,
  amount DECIMAL(10,2),
  merchant_id VARCHAR,
  country VARCHAR,
  PRIMARY KEY(card_number,
              transaction_time DESC));
```

Partition Key

```
CREATE TABLE credit_card_transactions(
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Clustering Column

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```

Primary Key

```
CREATE TABLE credit_card_transactions(
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              transaction_time DESC));
```

Data Model

CARD_NUMBER	XCTN_TIME	AMOUNT	COUNTRY	MERCHANT
5444…8389	13:58	$12.42	US	101
5444…8389	14:03	$98.03	US	158
5444…6027	13:59	$3.02	US	101
5444…6027	14:03	€23.78	ES	352
4532…1191	13:59	$50.38	US	102
4532…2189	14:02	$12.42	US	198

Partition Key

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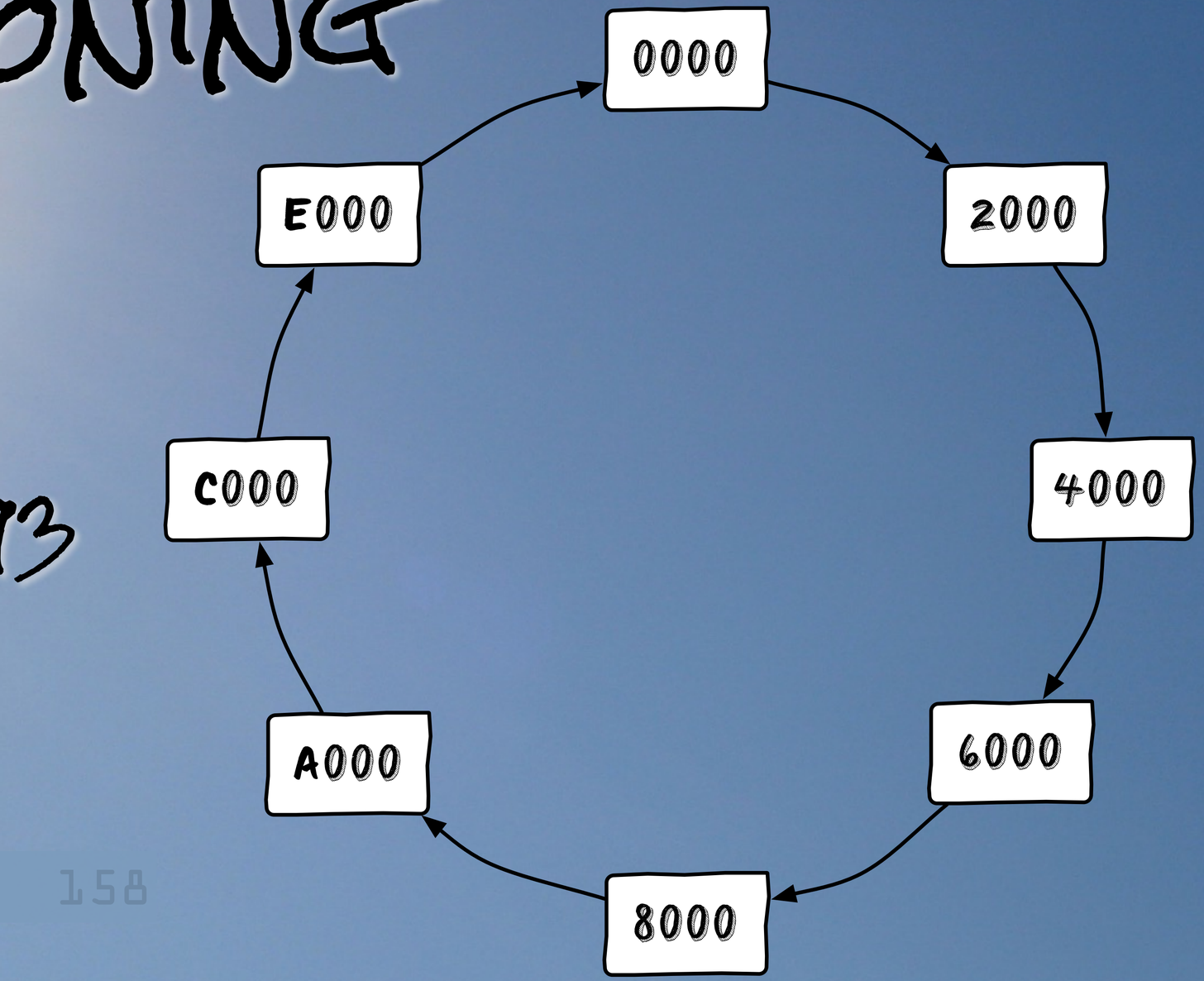
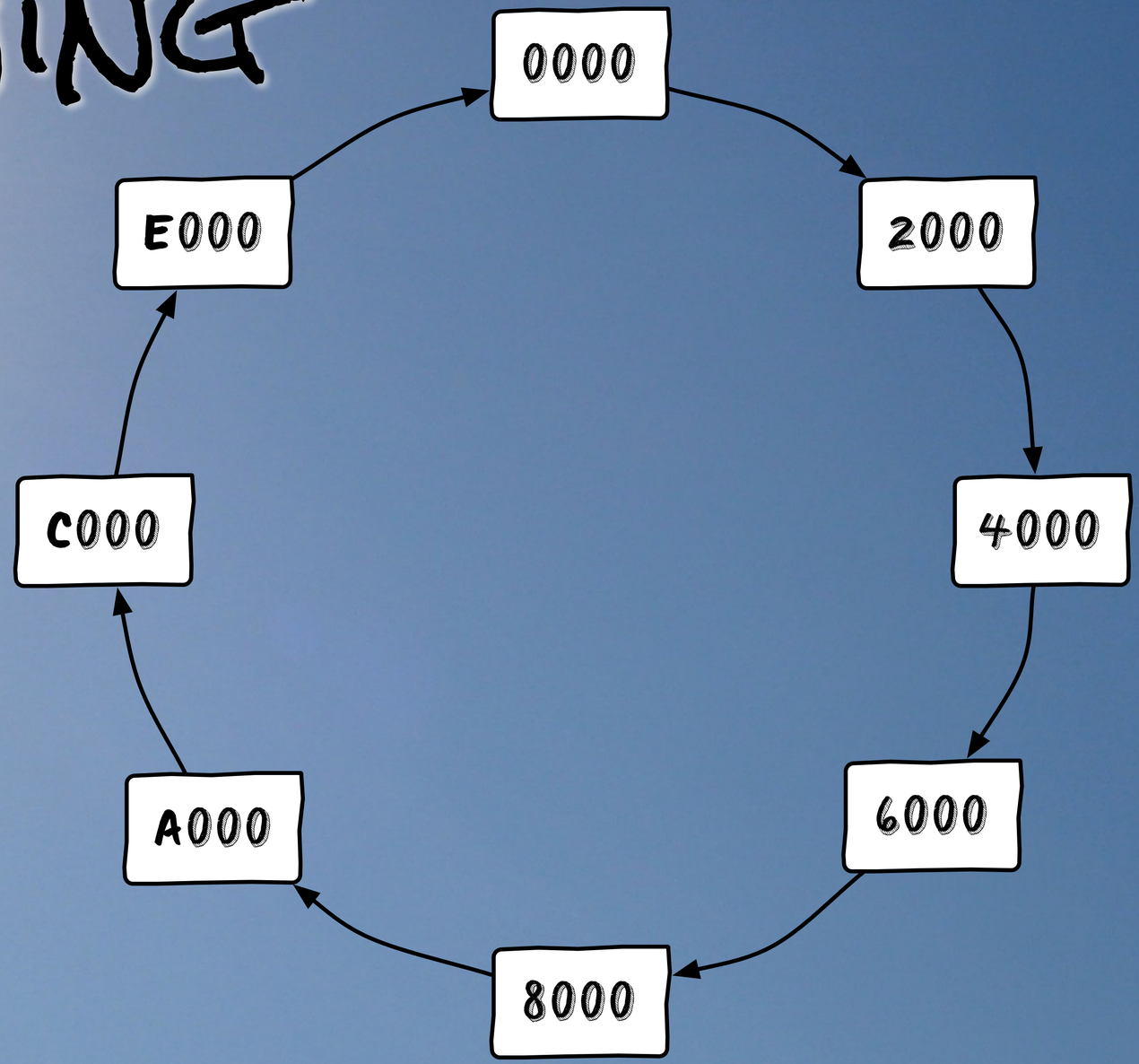
Partitioning



F(X) → 5D93

5444…8389

Partitioning



5D93

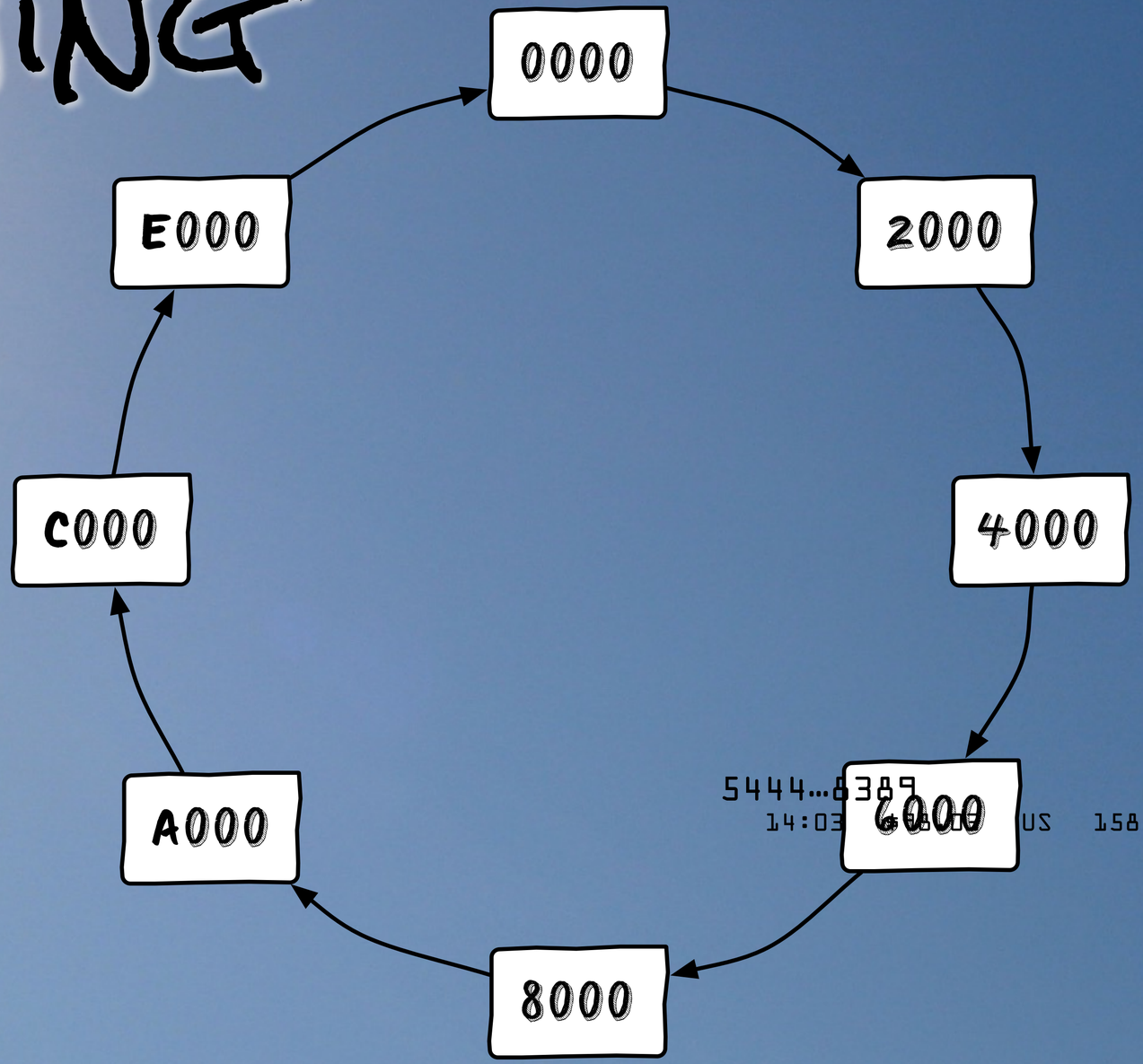
5444…8389

14:03 $98.03 US 158

Partitioning

F(X) → 5D93

5444…8389



Partitioning

Partition

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Partitions

- Clumps of related data
- Always on one server
- Accessed by consistent hashing

Consequences

- Design for low-latency, high-throughput reads and writes
- Inflexible ad-hoc queries
- Very little aggregation
- Very little secondary indexing


Spark

When do I use it?

- You have too much data
- You don't know the questions
- ~~You don't like MapReduce~~

You're tired of Hadoop lol

What are they saying?

- Distributed, functional
- "In-memory"
- "Real-time"
- Next-generation MapReduce

Paradigm :

Store collections in Resilient Distributed Datasets, or "RDDs"

Paradigm :

Transform RDDs into other RDDs

Paradigm :

Aggregate RDDs with "Actions"

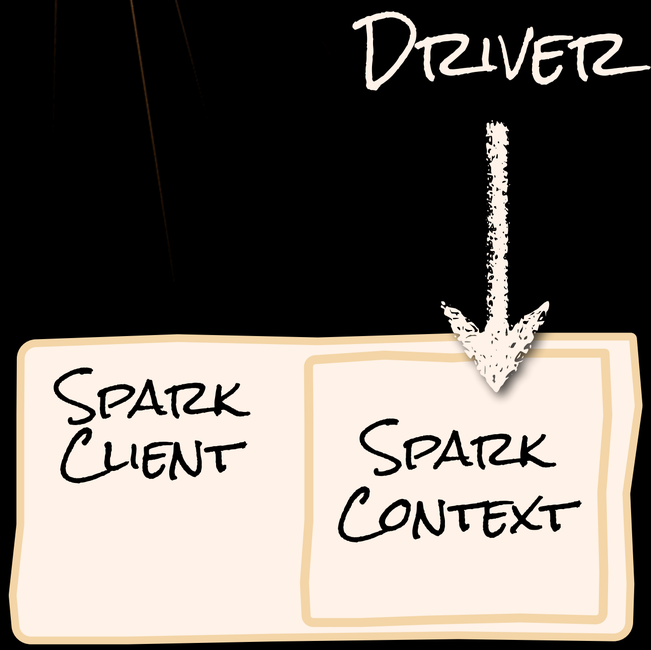
Paradigm :

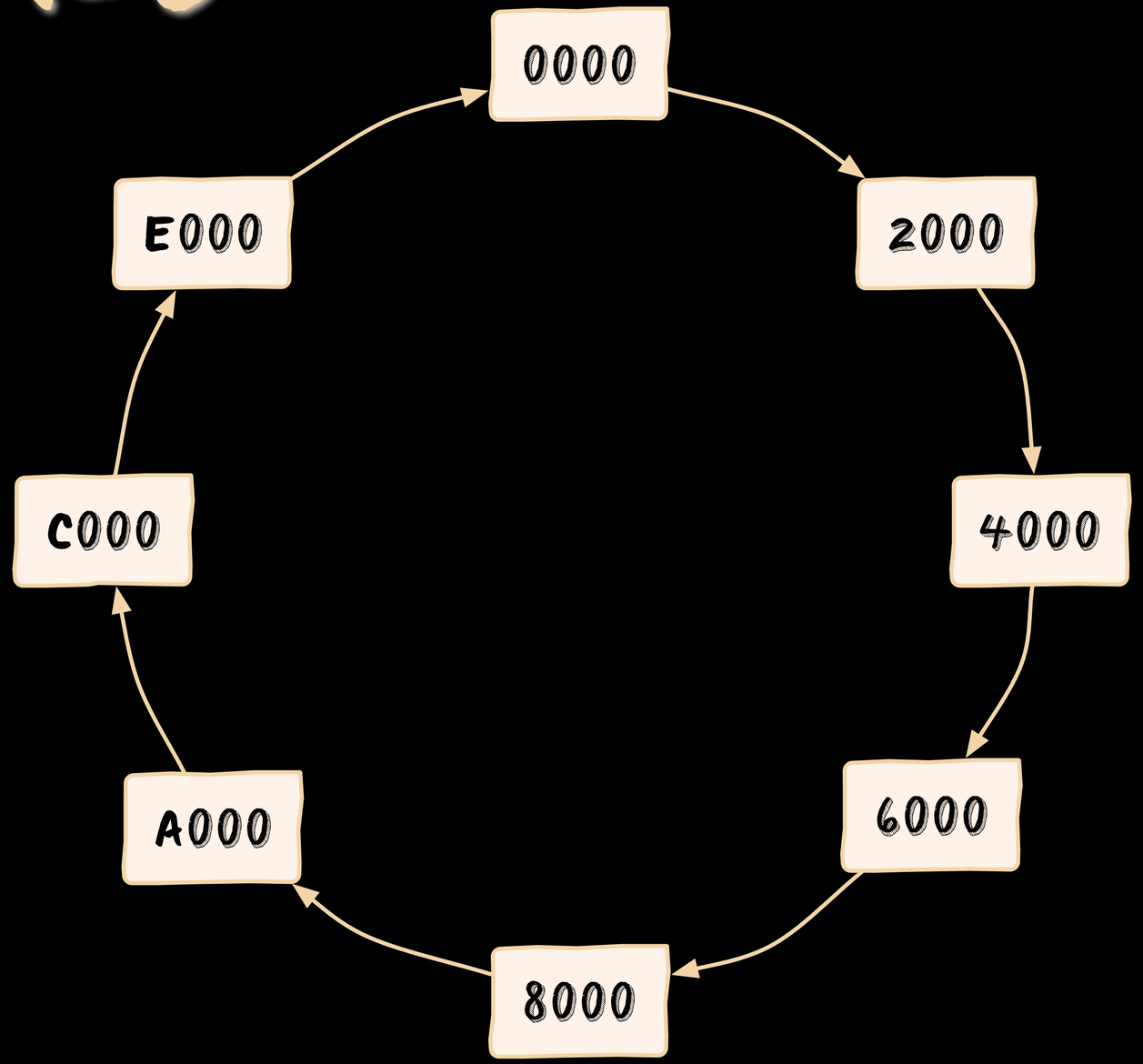
Keep track of a graph of transformations and Actions

Paradigm :

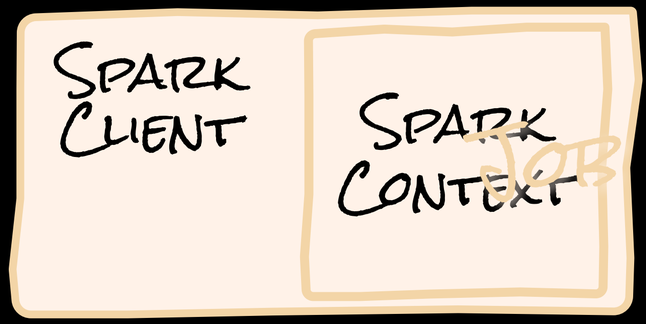
Distribute all of this
storage and computation

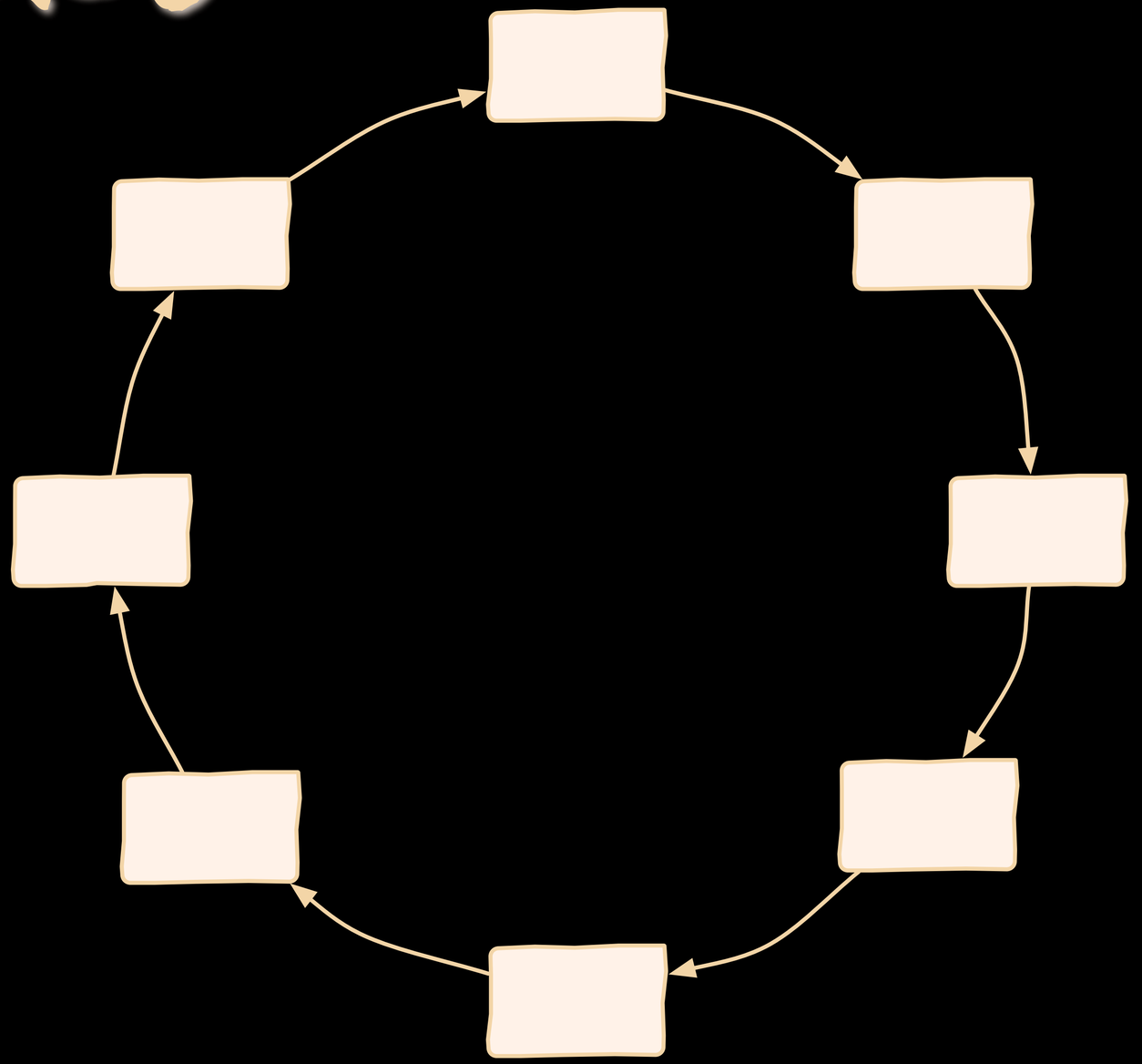
Architecture





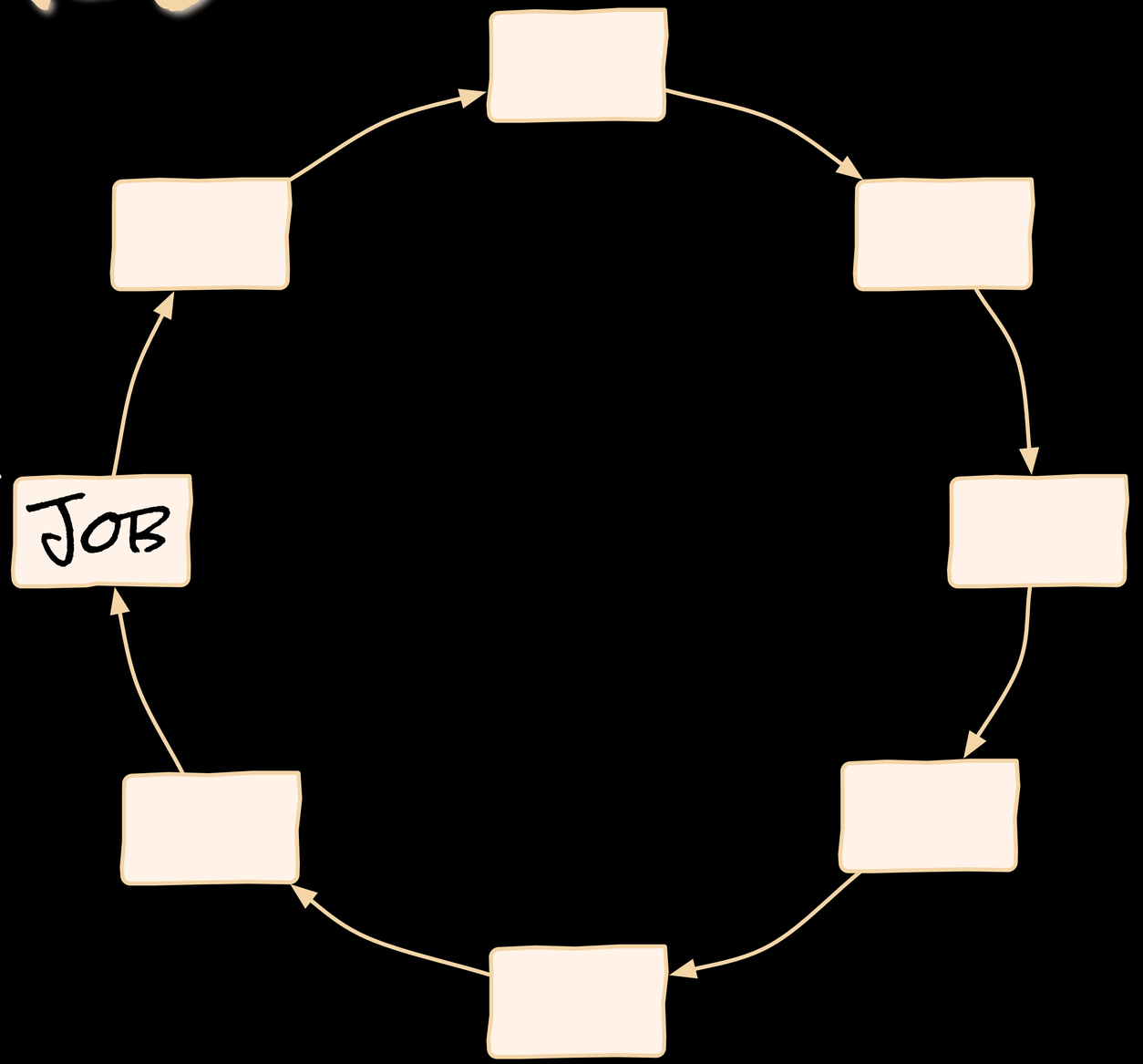
Architecture





Architecture

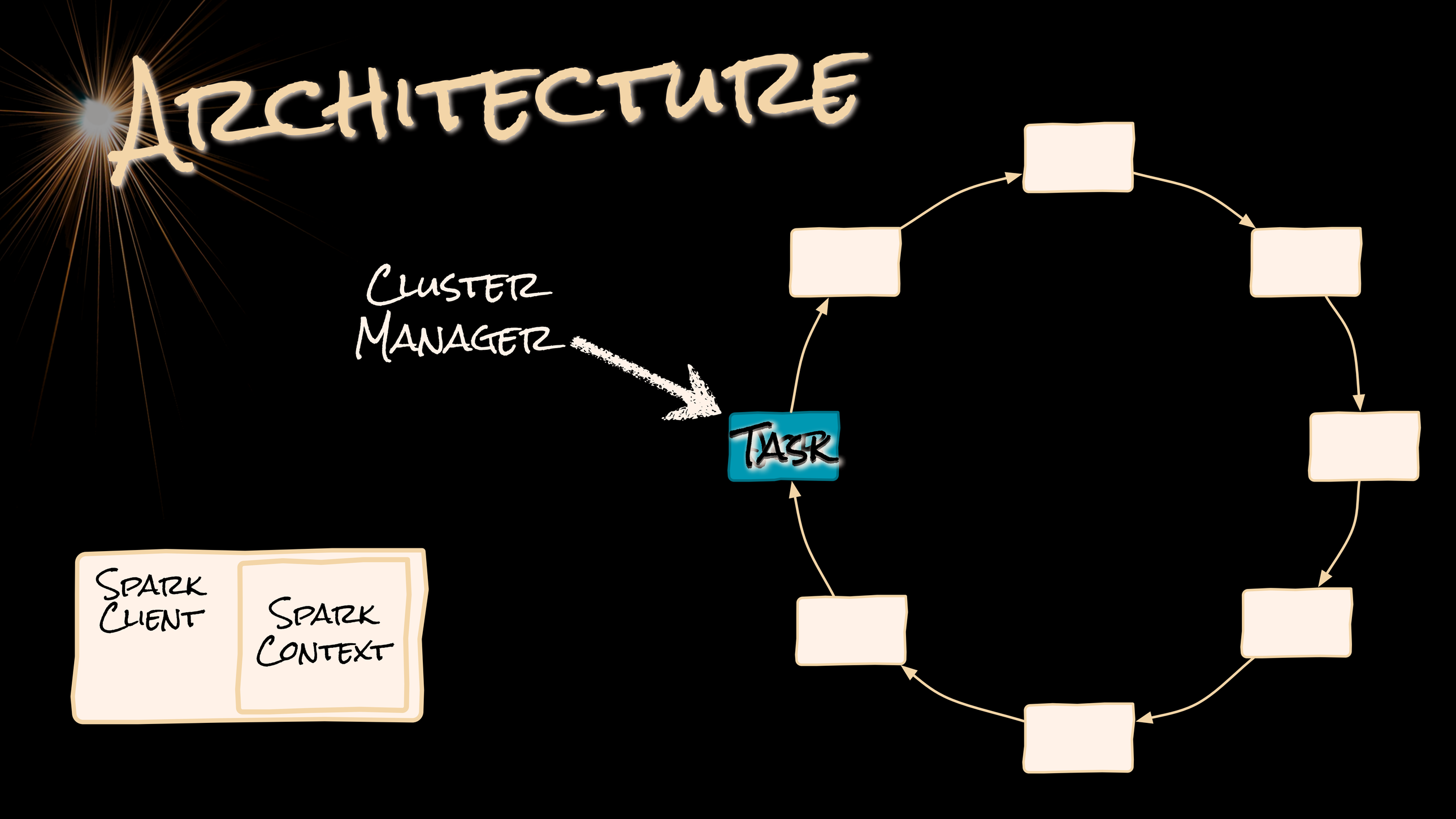
Cluster Manager



Spark Client

Spark Context

Architecture



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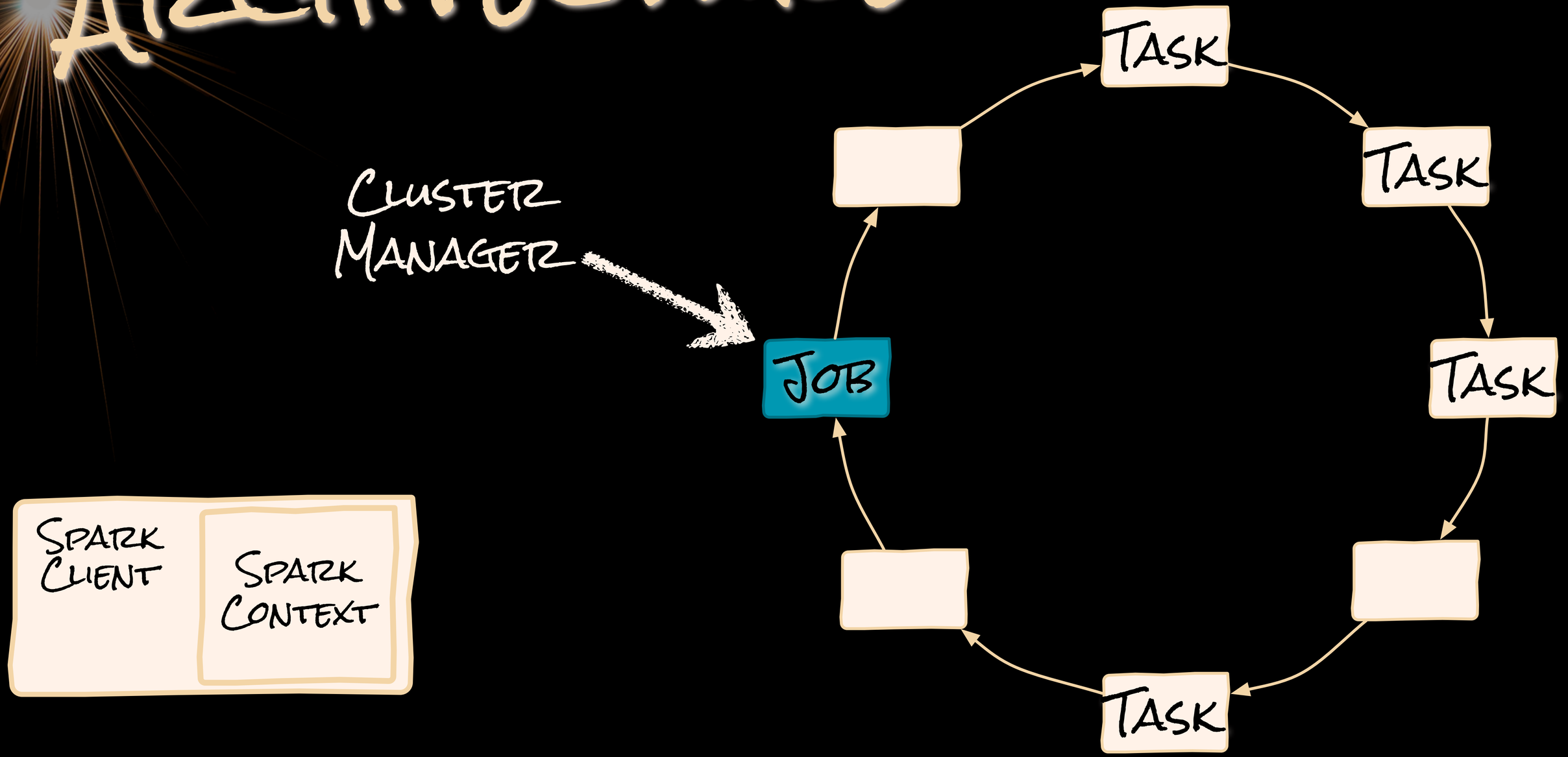
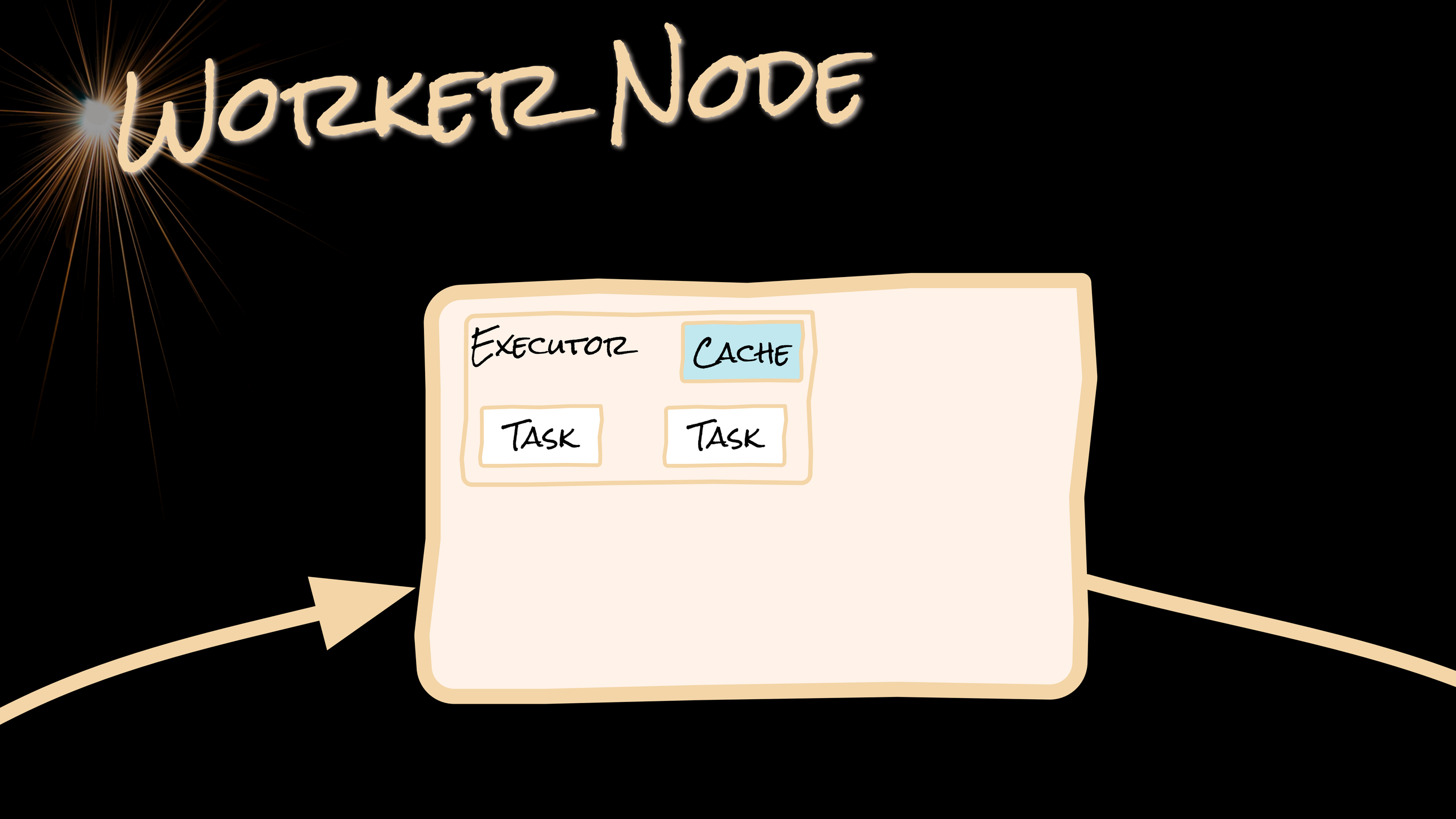
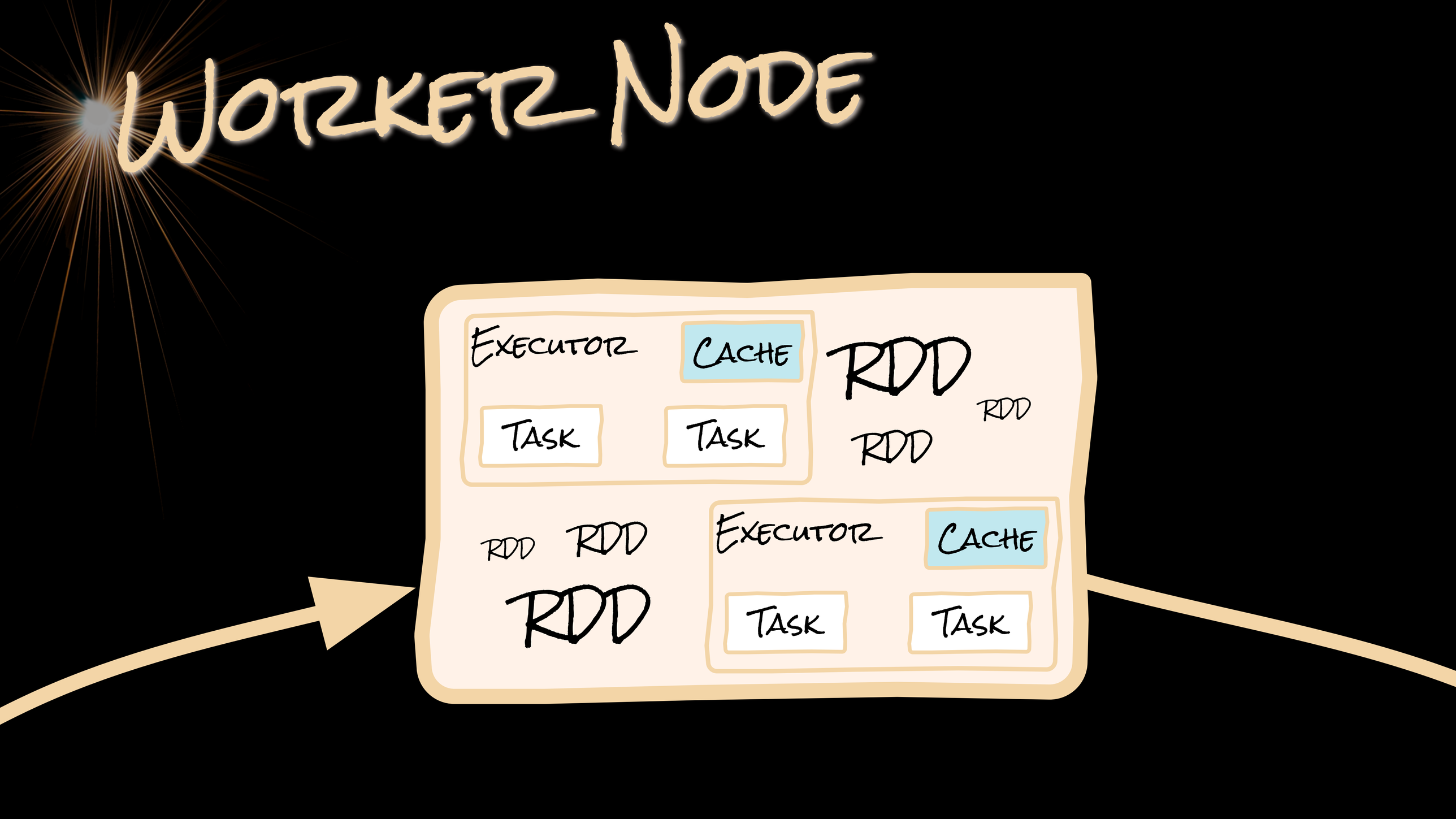



Worker Node
Executor
Cache
Task
Task

Worker Node


Executor
Cache
Task
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RDD
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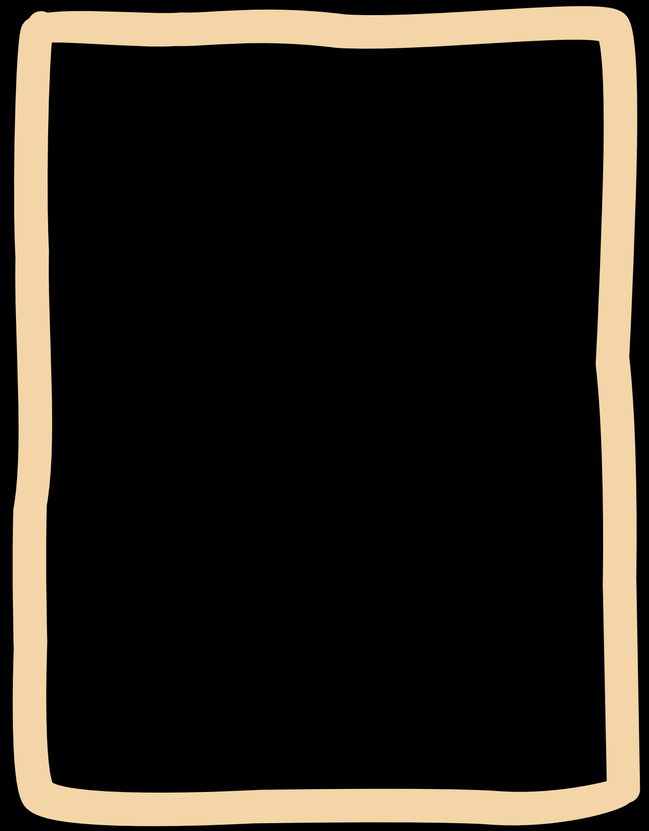
Task

What's an RDD?

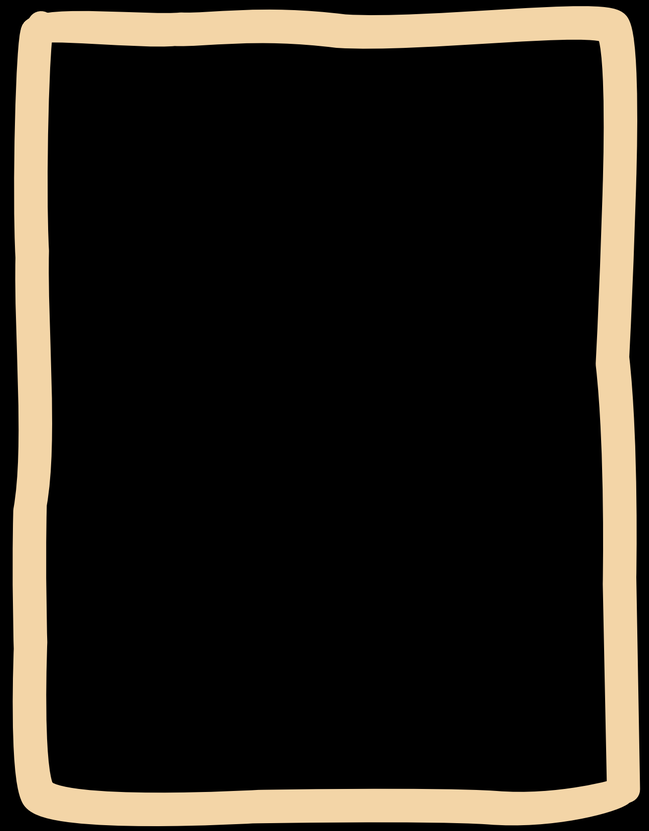
WHAT'S AN RDD?

THIS IS →



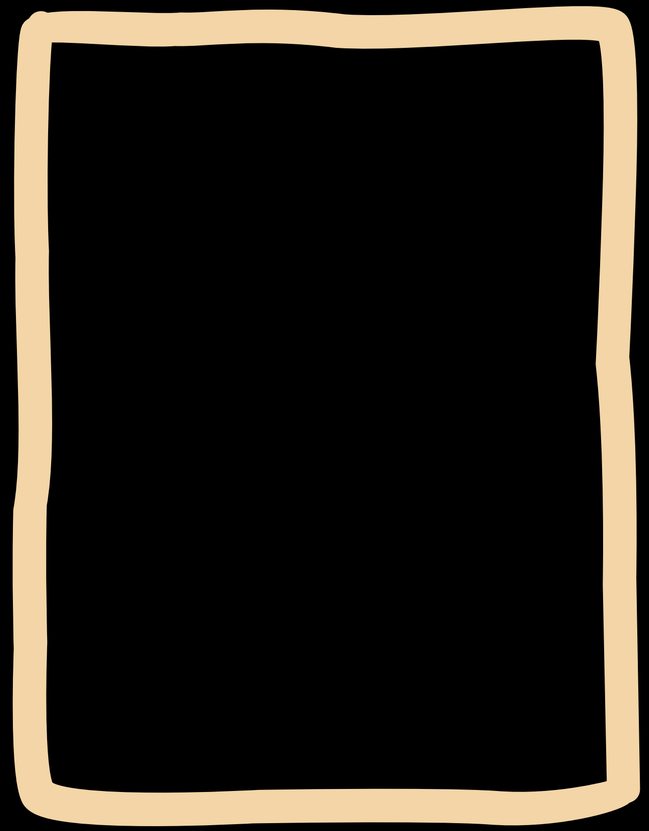
What's an RDD?

Bigger than a computer



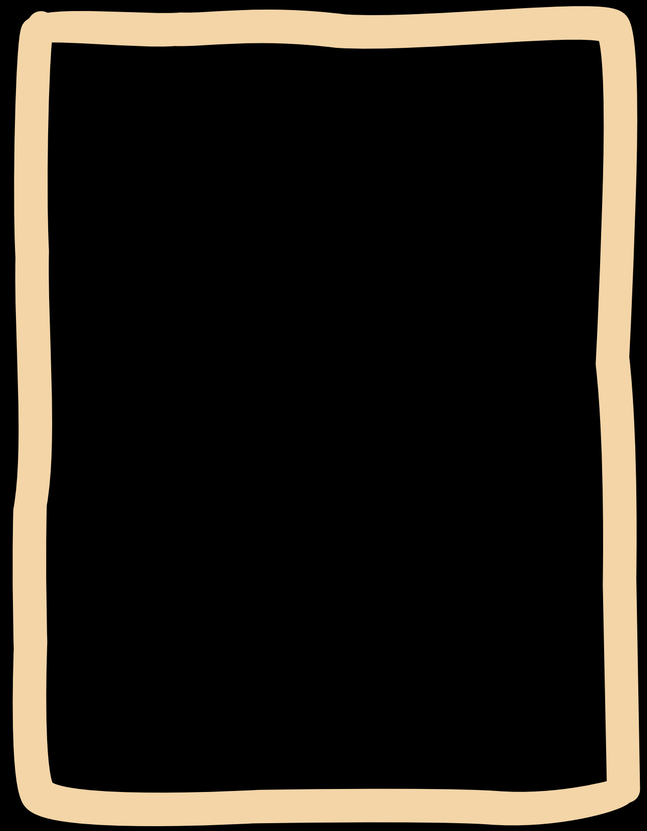
What's an RDD?

Read from an input source?



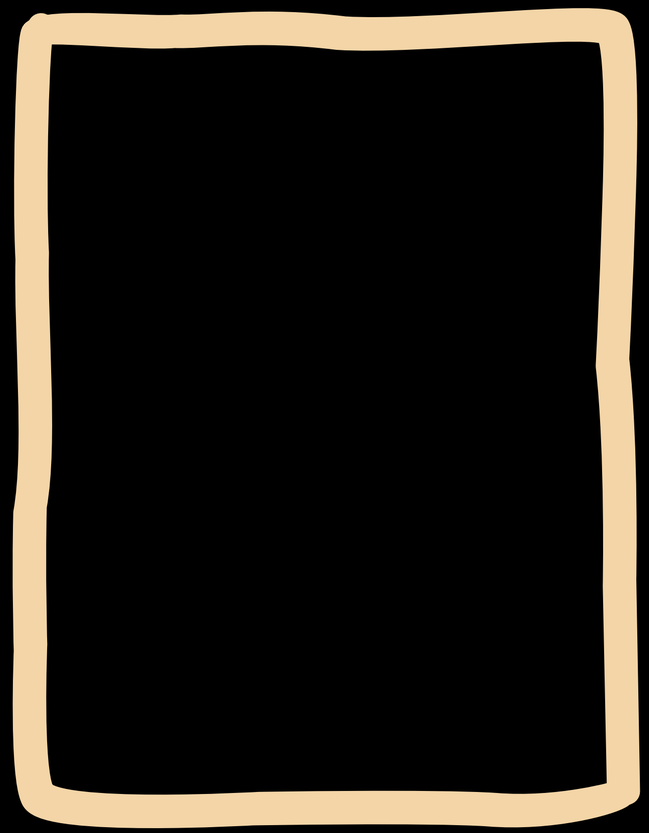
What's an RDD?

The output of a pure function?



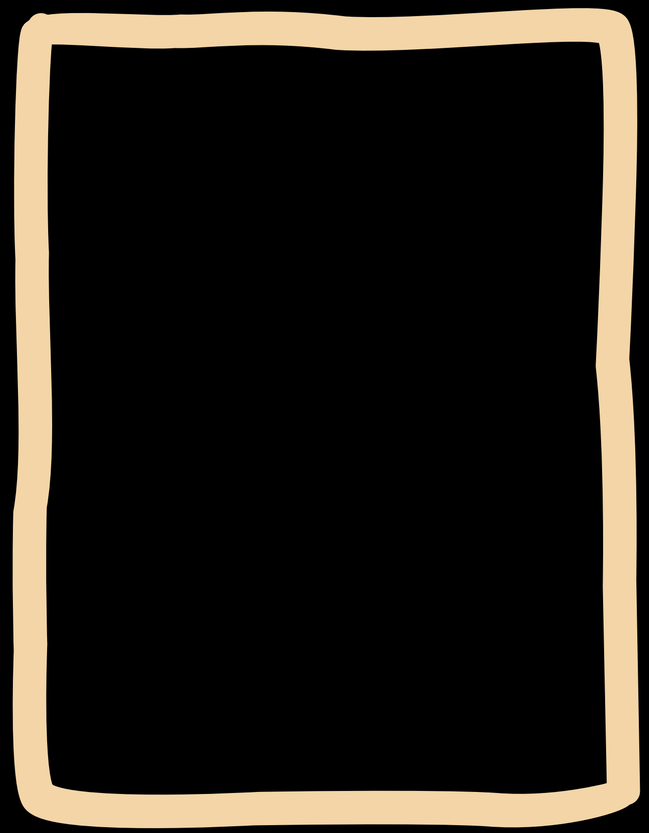
What's an RDD?

Immutable



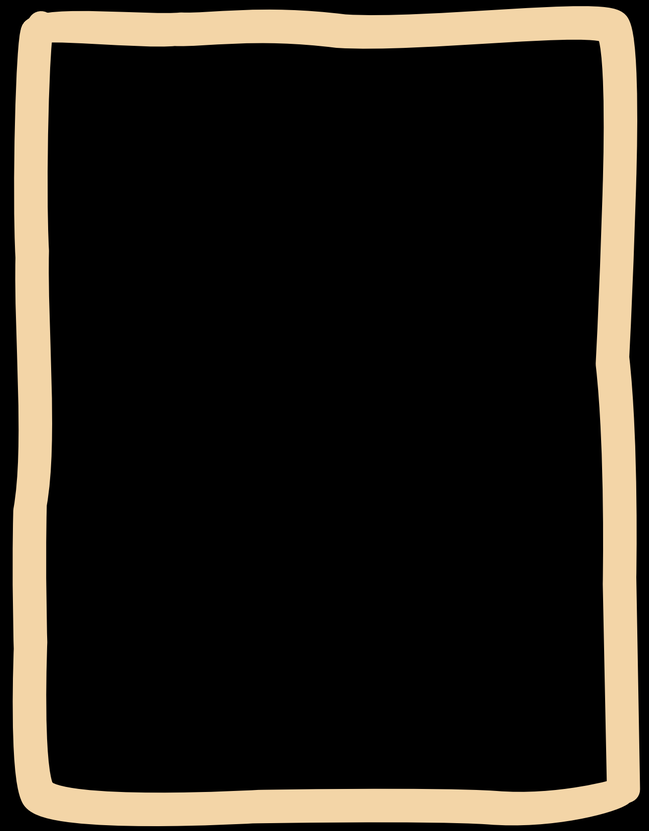
What's an RDD?

Typed



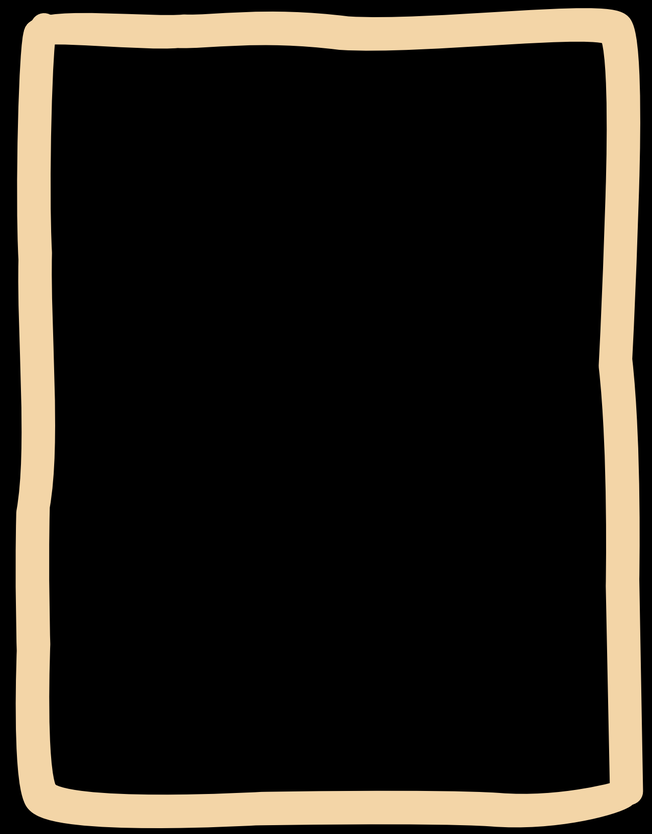
What's an RDD?

- Ordered



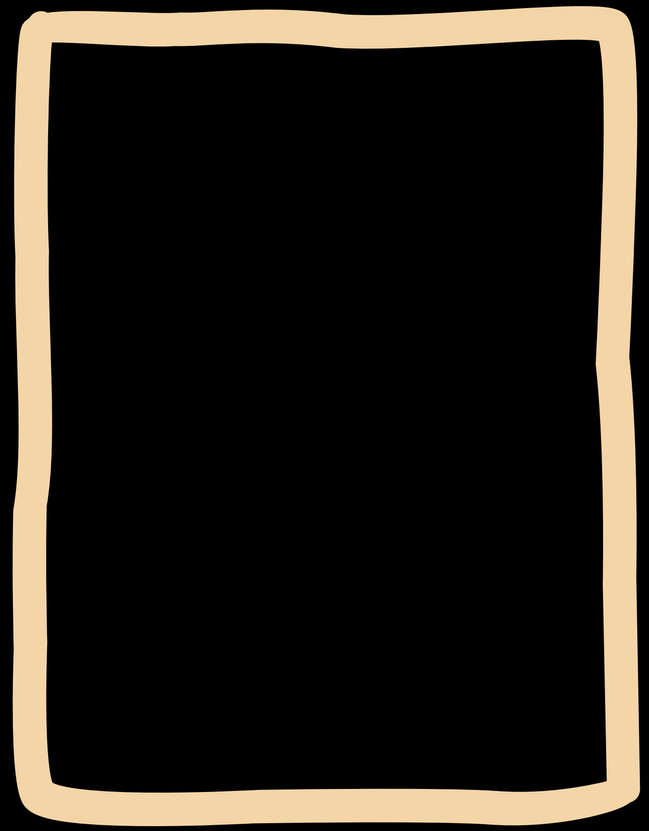
What's an RDD?

Functions comprise a Graph



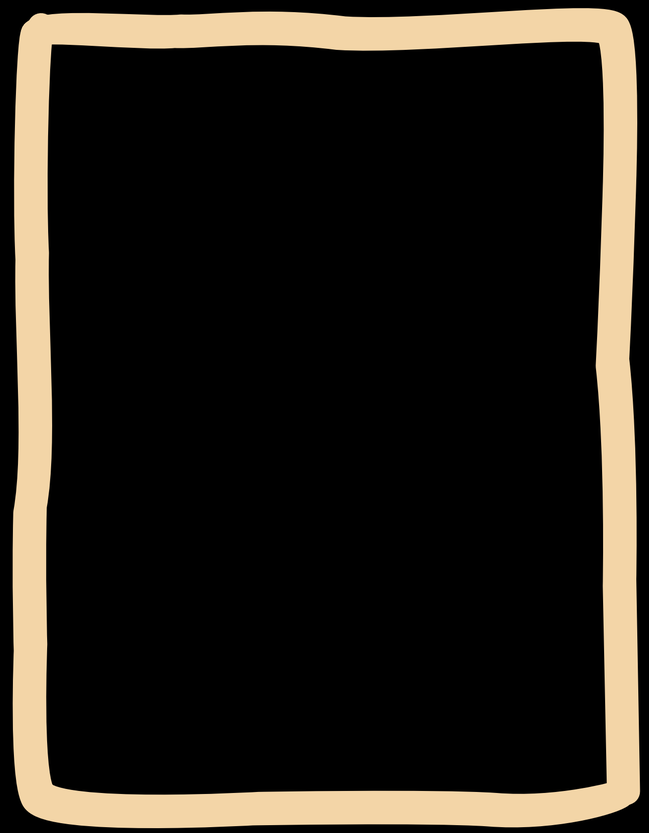
What's an RDD?

Lazily
Evaluated

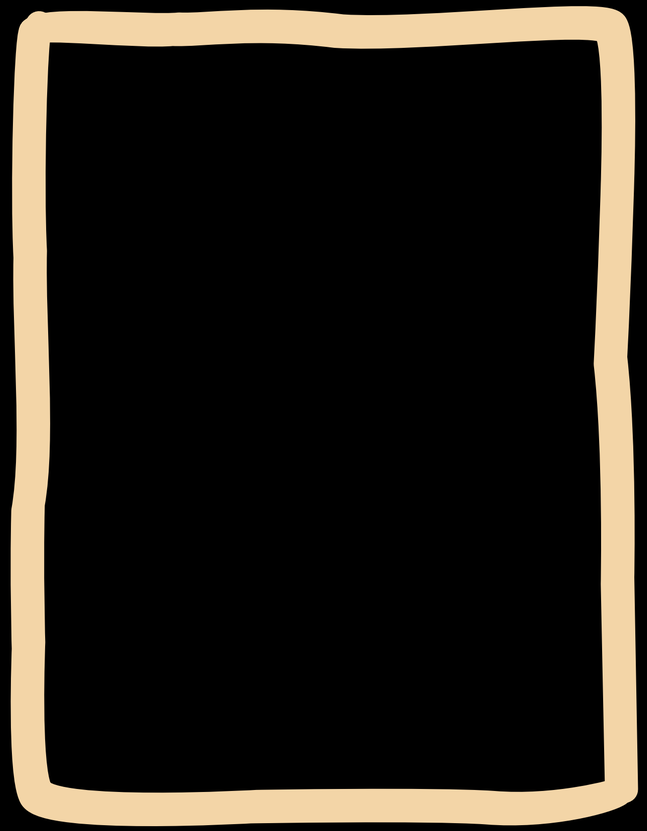


What's an RDD?

Collection of Things



Distributed, how?



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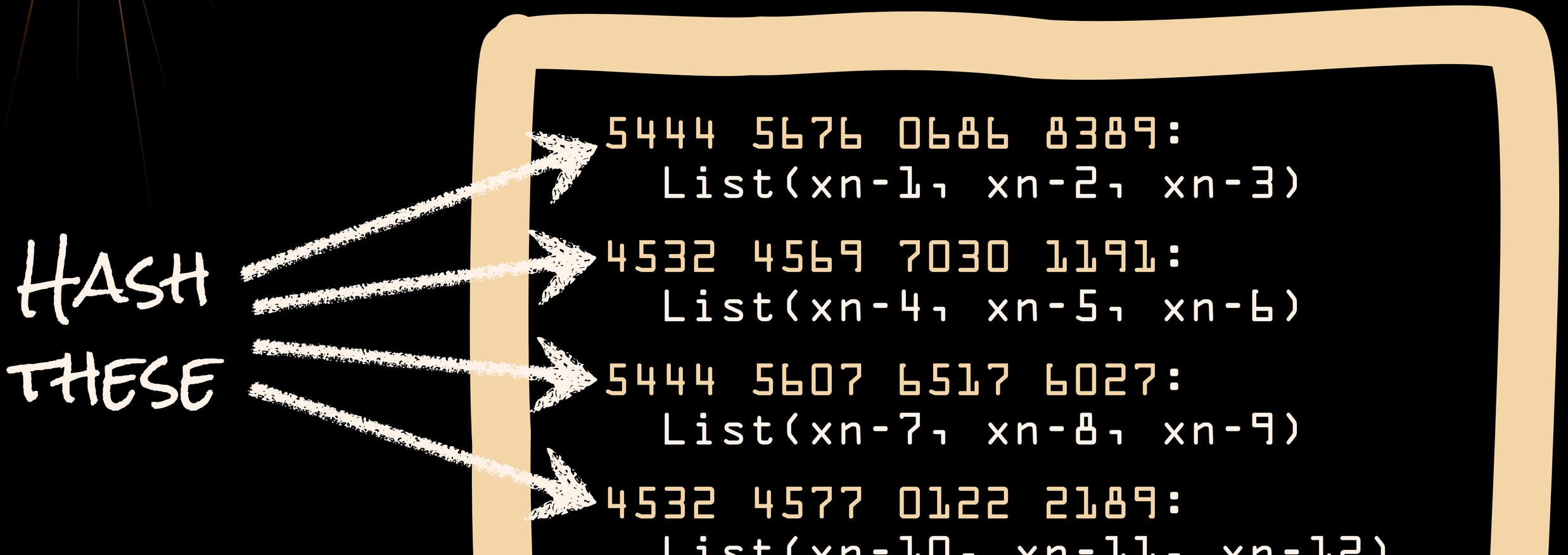
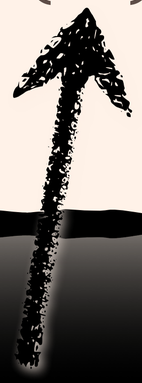


```
val conf = new SparkConf(true)
   .set("spark.cassandra.connection.host", “10.0.3.74”)

 val sc = new SparkContext(“spark://127.0.0.1:7077”,
                           “music”, conf)
 val transactions = sc. // cassandra stuff
   .partitionBy(new HashPartitioner(25)).persist()
  }
}
```



Cassandra Connector

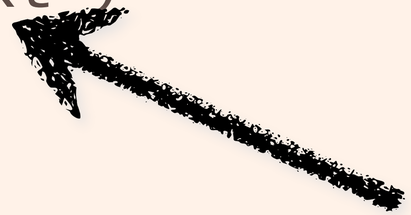
From a Text File

```
import org.apache.spark.{SparkConf, SparkContext}
import org.apache.spark.SparkContext._
import com.datastax.spark.connector._

object ScalaProgram {
 def main(args: Array[String]) {

   val conf = new SparkConf(true)
     .set("spark.cassandra.connection.host", "127.0.0.1")

   val sc = new SparkContext(“spark://127.0.0.1:7077”,
                             “music”, conf)
    val rdd = sc.textFile(“/actual/path/raven.txt”)
 }
}
```



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```

From a Table

```
val conf = new SparkConf(true)
  .set("spark.cassandra.connection.host", "127.0.0.1")

val sc = new SparkContext(“spark://127.0.0.1:7077”,
                          “music”, conf)
val xctns = sc.cassandraTable(“payments”,
                              “credit_card_transactions")
```

Projection

```
val conf = new SparkConf(true)
  .set("spark.cassandra.connection.host", "127.0.0.1")

val sc = new SparkContext(“spark://127.0.0.1:7077”,
                          “music”, conf)
val xctns = sc.cassandraTable(“payments”,
                              “credit_card_transactions”)
              .select(“card_number”, “country”)
```

Making K / V pairs

```
val conf = new SparkConf(true)
  .set("spark.cassandra.connection.host", "127.0.0.1")

val sc = new SparkContext(“spark://127.0.0.1:7077”,
                          “music”, conf)
val countries = xctns.map(x => (x.getString(“card_number”),
                                x.getString(“country”))
```

Count up Countries

```
val conf = new SparkConf(true)
  .set("spark.cassandra.connection.host", "127.0.0.1")

val sc = new SparkContext(“spark://127.0.0.1:7077”,
                          “music”, conf)
val cCount = xctns.reduce(card, country =>
             // cool analysis redacted!
             )
```

Make k / v pairs

```
val conf = new SparkConf(true)
  .set("spark.cassandra.connection.host", "127.0.0.1")

val sc = new SparkContext(“spark://127.0.0.1:7077”,
                          “music”, conf)
val countries = xctns.map(x => (x._1, x._2))
```

Persisting to a Table

```
val conf = new SparkConf(true)
  .set("spark.cassandra.connection.host", "127.0.0.1")

val sc = new SparkContext(“spark://127.0.0.1:7077”,
                          “music”, conf)
val fraud = cCount.saveToCassandra(“payments”,
                                   “frequent_countries”)
```

Thank you!

@tlberglund