SparkR

Advance Analytics for Big Data

A workshop with the Spark-Meetup
Tuesday 17th Nov 2015

Agenda

- INTRODUCTION
- SPARK OVERVIEW
- DATAFRAMES OVERVIEW
- SPARKR
- DEMO: MACHINE LEARNING

WHO AM I?

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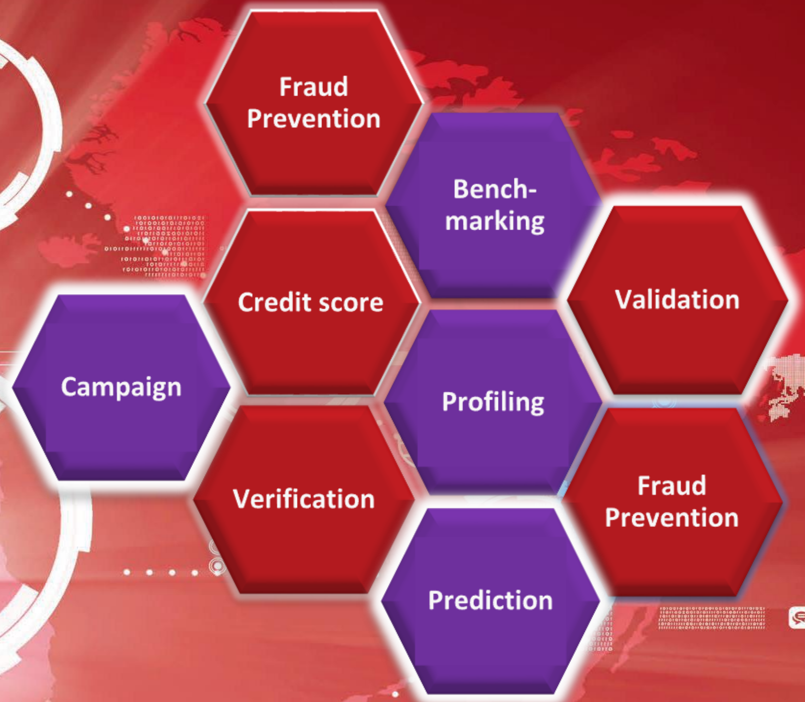
veda applied intelligence is a data analytics business providing information and analytic services to businesses to assist them in making decisions and managing risks.

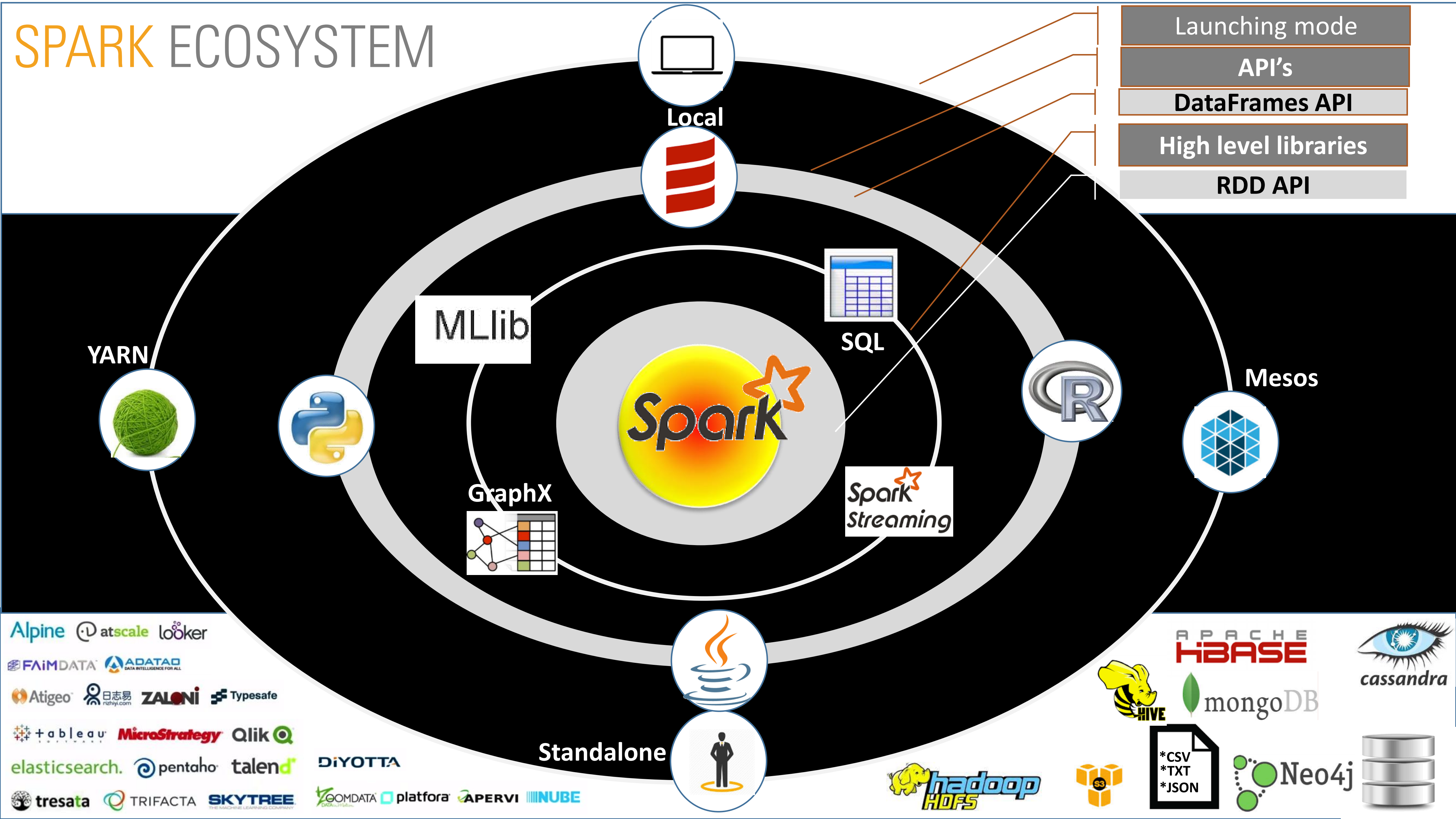
Veda holds data on more than **16.4 million** credit-active individuals, **3.6 million** on companies and businesses and **3.4 million** on Sole Traders throughout Australia, providing customers with the ability to make more informed decisions.



SPARK USERS in production by over 500 organizations

Telecom	Telefonica	verizon	Media	NETFLIX	Spotify	NBCUniversal
YAHOO!	Retail	阿里巴巴 Alibaba.com	ebay	Tencent 腾讯	Pharma	NOVARTIS
Investment	Goldman Sachs	Research	HHMI janelia farm research campus	Distributors	databricks	MAPR
IBM	cloudera	SAP	NTT DaTa	ORACLE	DATASTAX	Hortonworks
other	intel	CISCO	amazon web services	redhat.	Space	NASA

SPARK ECOSYSTEM



INITIALIZE SPARK

DataFrame
Read less data

Optimally compressed

uses partitioning

skips data using statistics

Spark Context (sc)

The window to the world of Spark

sqlContext

The window to the world of DataFrames

Transformation (lazy)

Takes an RDD/DataFrame and returns a new RDD/DataFrame

Action

Causes an RDD to be evaluated (often storing the result)

mapPartitions()

ShuffledRDD

ZipPartitions()

How can I read this? Compute the average with…

```
first_name,last_name,gender,age
Erin,Shannon,F,42
Norman,Lockwood,M,81
Miguel,Ruiz,M,64
Rosalita,Ramirez,F,14
Ally,Garcia,F,39
Claire,McBride,F,23
Abigail,Cottrell,F,75
José,Rivera,M,59
Ravi,Dasgupta,M,25
…
```

hadoop

Spark RDD

Spark DataFrame

WRITE LESS CODE, BETTER READABILITY

hadoop

```
private IntWritable one =
  new IntWritable(1)
private IntWritable output =
  new IntWritable()
proctected void map(
    LongWritable key,
    Text value,
    Context context) {
  String[] fields = value.split("\t")
  output.set(Integer.parseInt(fields[1]))
  context.write(one, output)
}

IntWritable one = new IntWritable(1)
DoubleWritable average = new DoubleWritable()

protected void reduce(
    IntWritable key,
    Iterable<IntWritable> values,
    Context context) {
  int sum = 0
  int count = 0
  for(IntWritable value : values) {
     sum += value.get()
     count++
    }
  average.set(sum / (double) count)
  context.Write(key, average)
}
```

Spark **RDD**

```
peopleRDD <- textFile(sc, “people.txt”)
lines <- flatMap(peopleRDD,
function(line) {
strsplit(line, ", ")
})
ageInt <- lapply(lines,
function(line) {
as.numeric(line[2])
})
sum <- reduce(ageInt,function(x,y) {x+y})
avg <- sum / count(peopleRDD)
```

Spark **DataFrame**

```
df <- read.df(sqlCtx, “people.json”, “json”)
avg <- select(df, avg(df$age))
```

Super awesome distributed, in-memory collections
Schemas == metadata, structure and declarative

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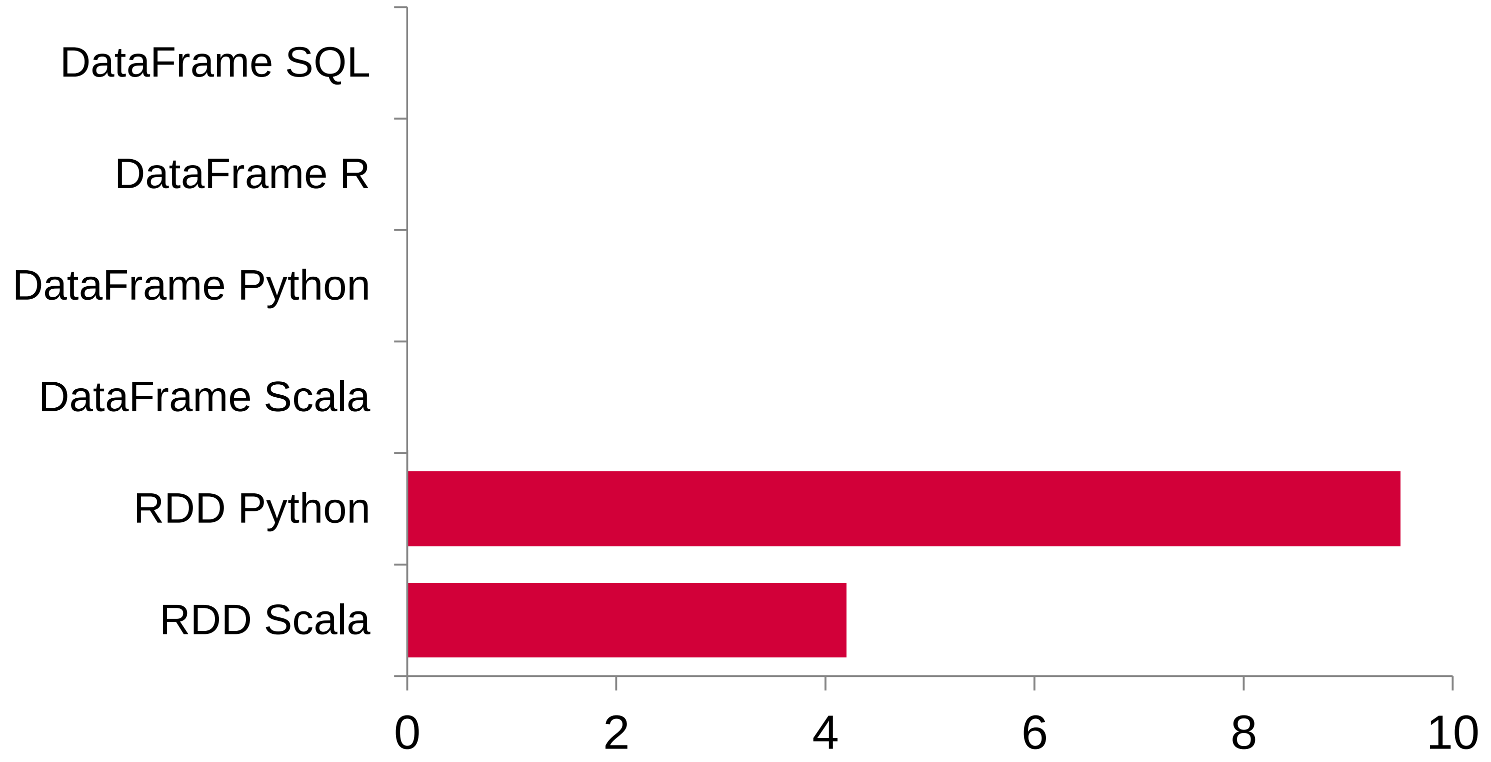
NOT R v PYTHON v SCALA, IT'S R/PYTHON/SCALA + SPARK

Easier to program

Significantly fewer Lines of Code

Improved performance

via intelligent optimizations and code-generation



Time to Aggregate 10 million int pairs (secs)

https://gist.github.com/rxin/c1592c133e4bccf515dd

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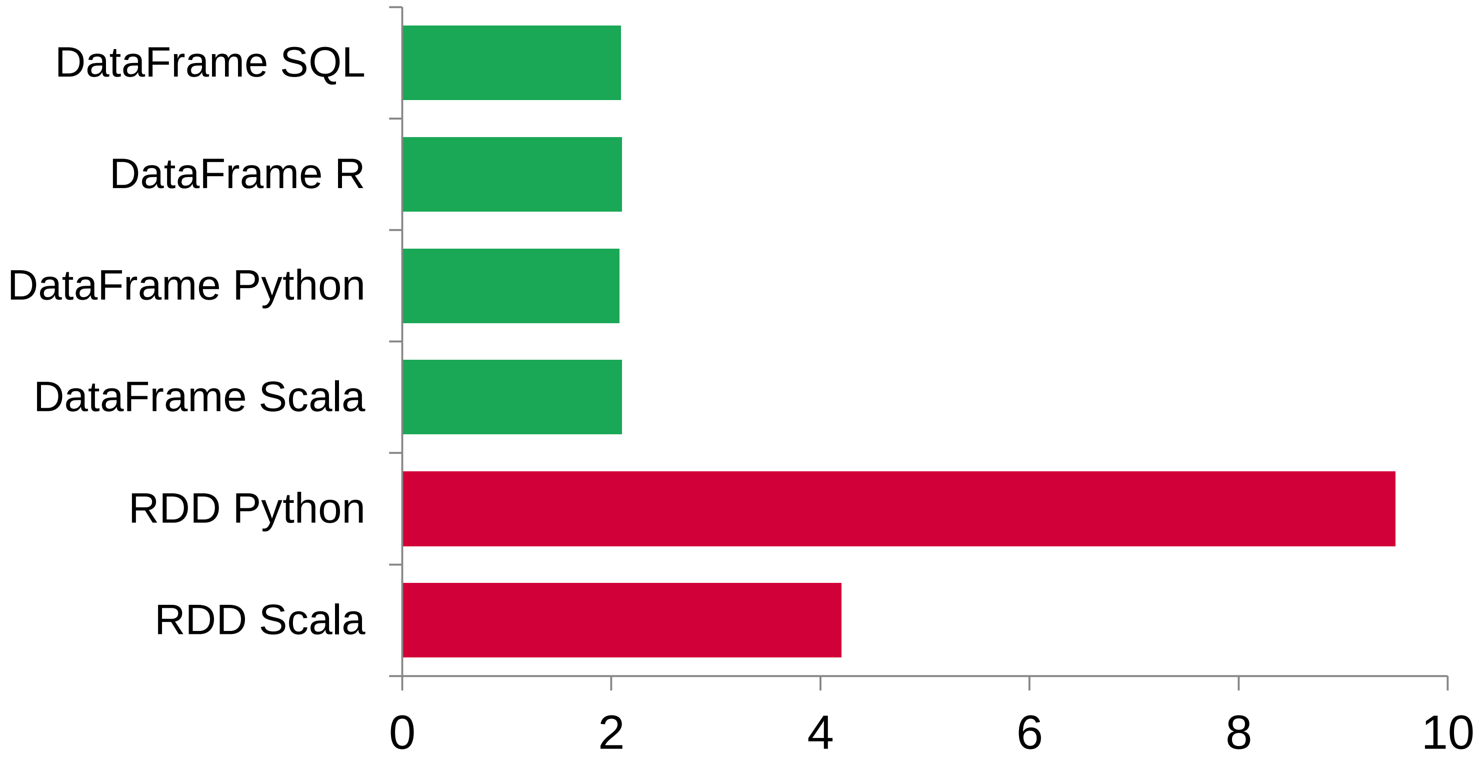

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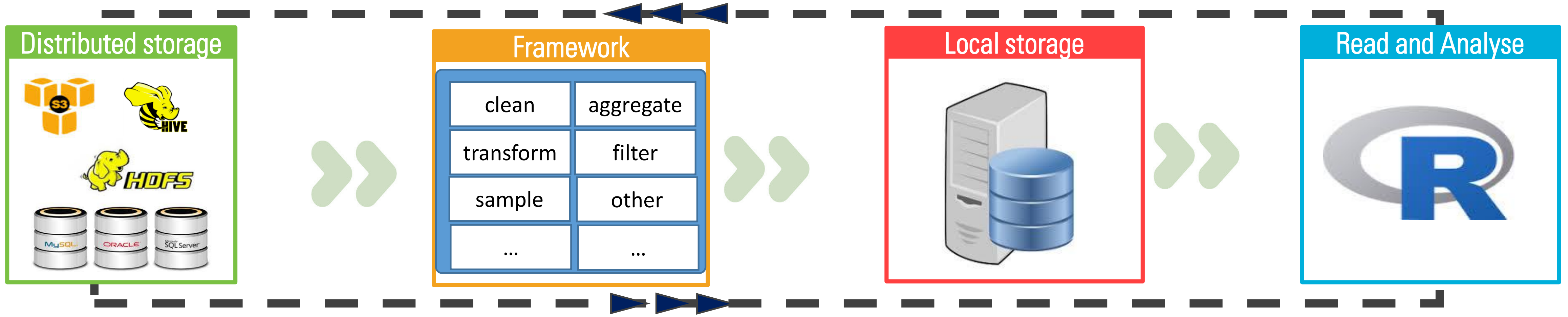
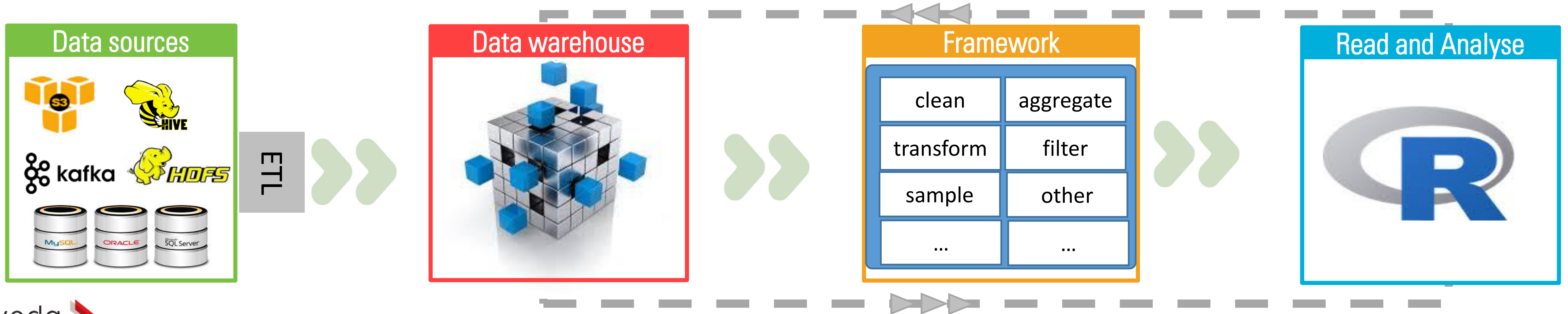
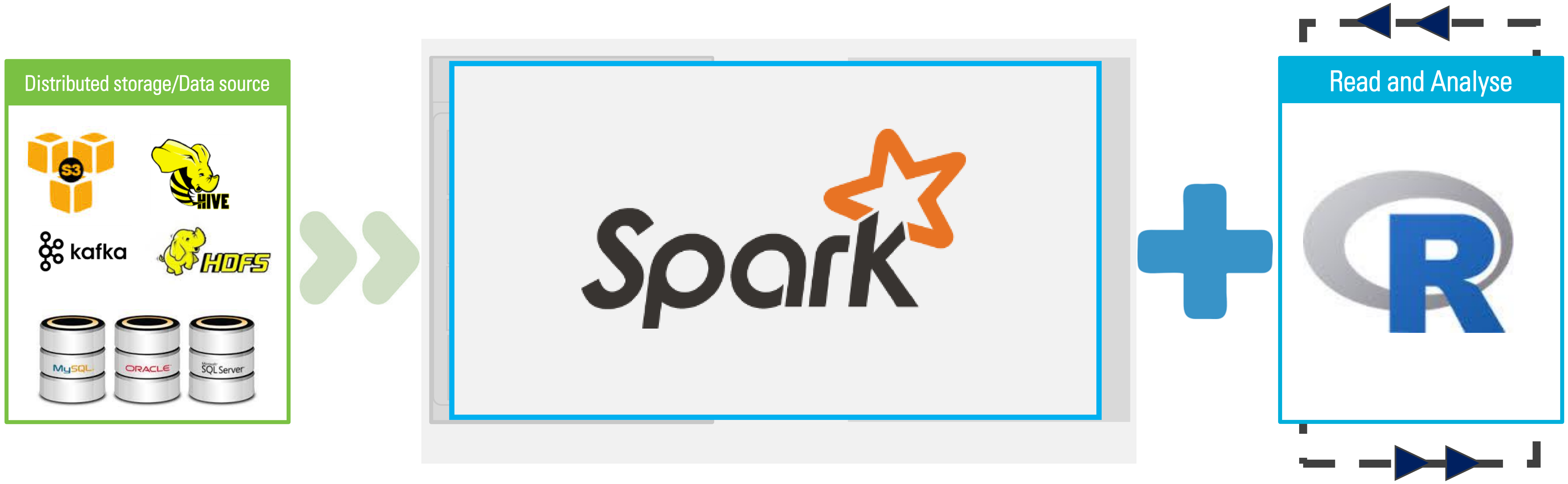
LIMITATION - COMPLICATION:R with other frameworks

R dynamic design imposes performance problem on runtime (single threaded, fit all in memory). Data scientists uses R in conjunction with other frameworks as





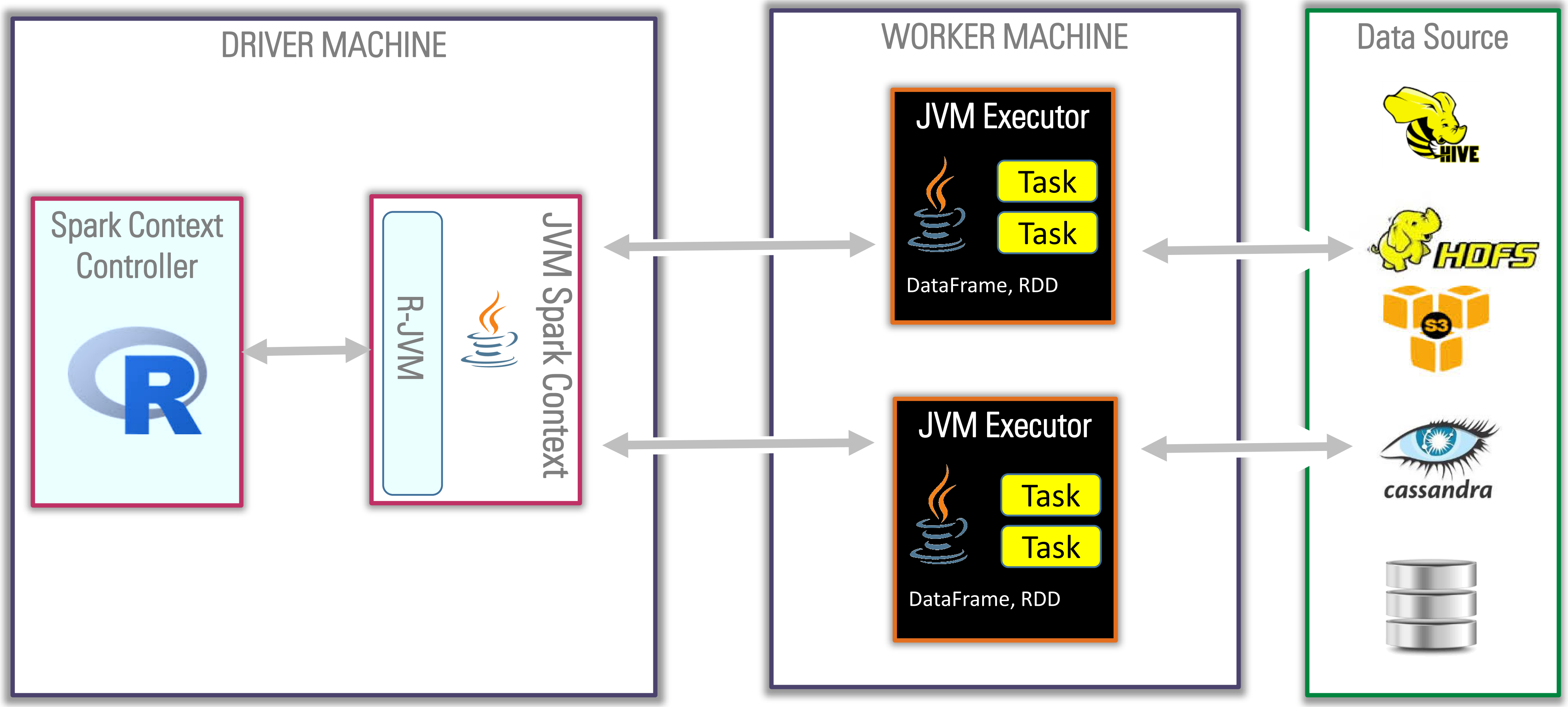
USE SPARK'S DISTRIBUTED, PARRLLEL IN MEMORY COLLECTION



distributed/robust processing, off-memory data structures for interactive analysis at speed

Dynamic environment, interactvity, packages, visualizaJon

SPARKR ARCHITECTURE



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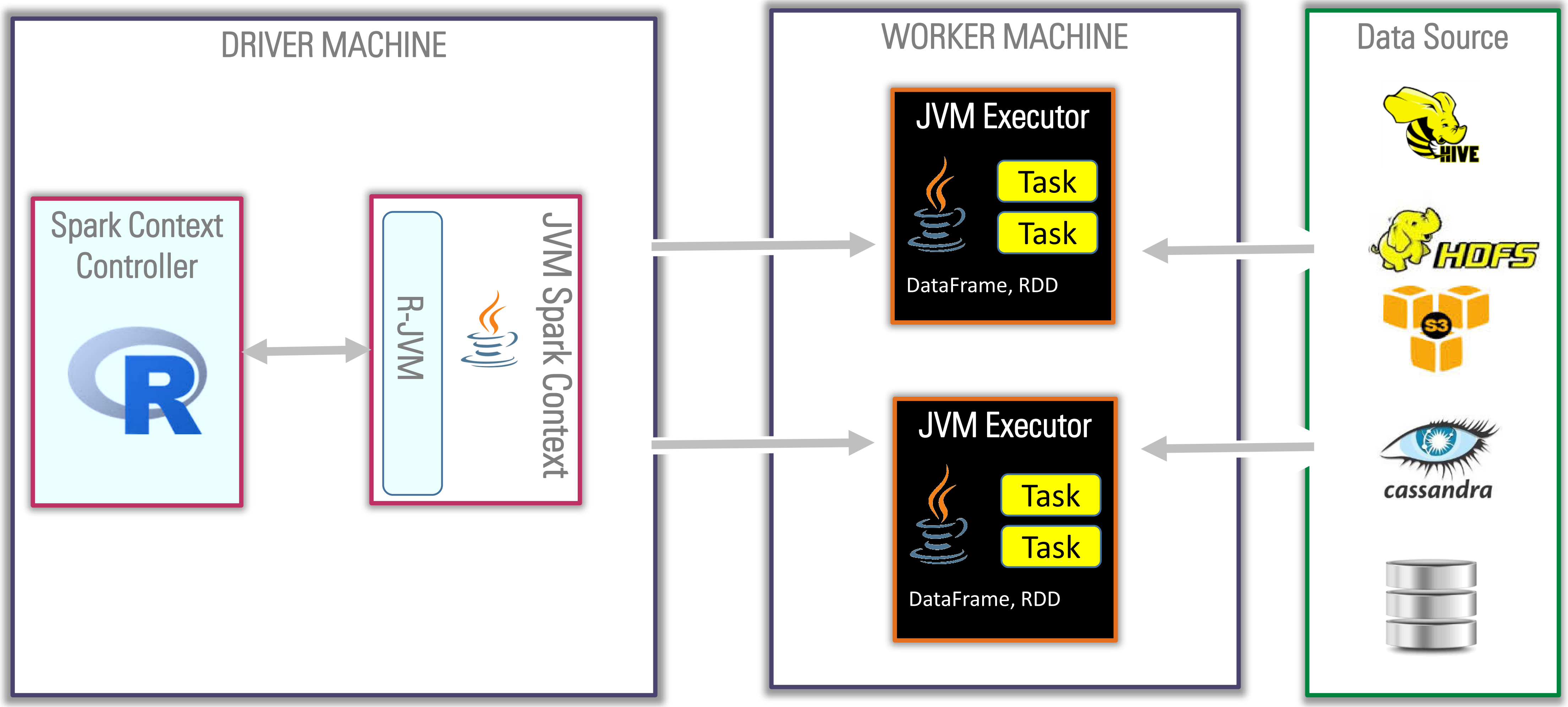

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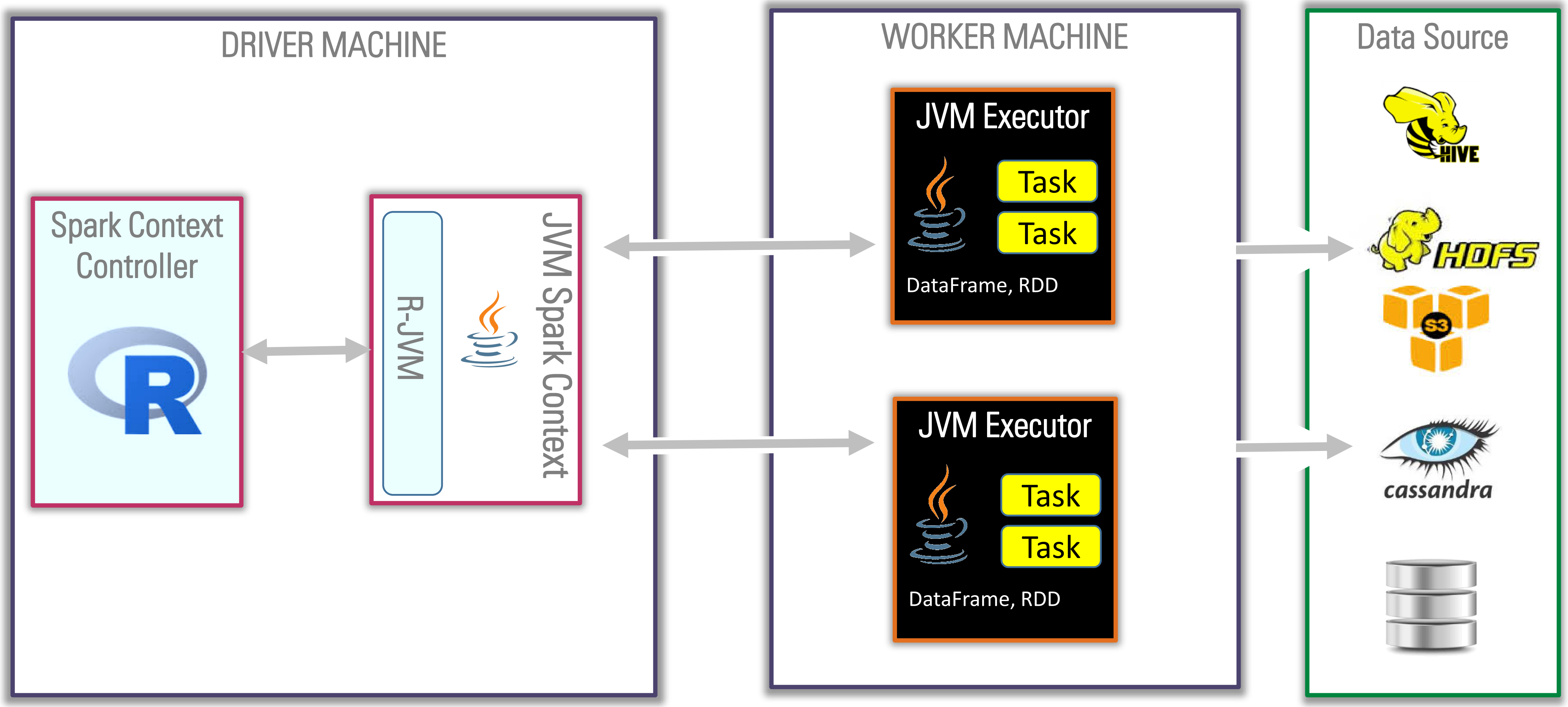
SPARKR ARCHITECTURE



DEMO

Data wrangling and
Machine learning with SparkR

Questions

Slides, Demo, and Data available on GitHub at

@SamuelShamiri

https://github.com/SShamiri/SparkR