The structure spectrum

Structured	Semi-structured	Unstructured
Relational Databases	HTML	Plain text
Parquet	XML	Generic media
Formatted Messages	JSON	

Tabular data

- Simple data format
- Common variants:
  - Comma Separated Values (CSV),
  - Tab Separated Values (TSV)

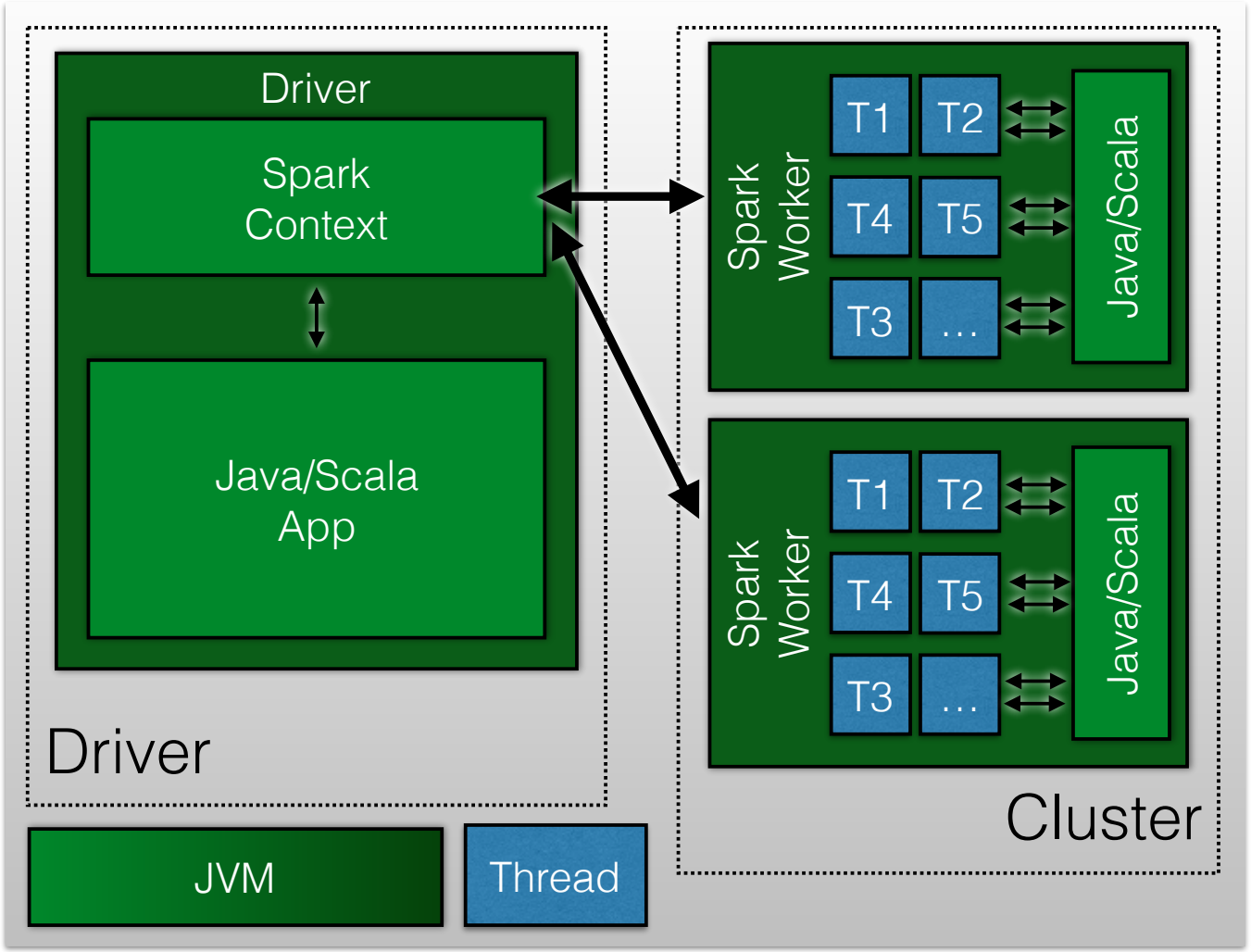
Tabular data

1	Genom	_	PR	PR	_	3	AA	_	_
2	skattereformen	_	NN	NN	_	1	PA	_	_
3	införs	_	VV	VV	_	0	ROOT	_	_
4	individuell	_	AJ	AJ	_	5	AT	_	_
5	beskattning	_	VN	VN	_	3	SS	_	_
6	(	_	IR	IR	_	5	IR	_	_
7	särbeskattning	_	VN	VN	_	5	AN	_	_
8	)	_	IR	IR	_	5	JR	_	_
9	av	_	PR	PR	_	5	ET	_	_
10	arbetsinkomster	_	NN	NN	_	9	PA	_	_
11	.	_	IP	IP	_	3	IP	_	_

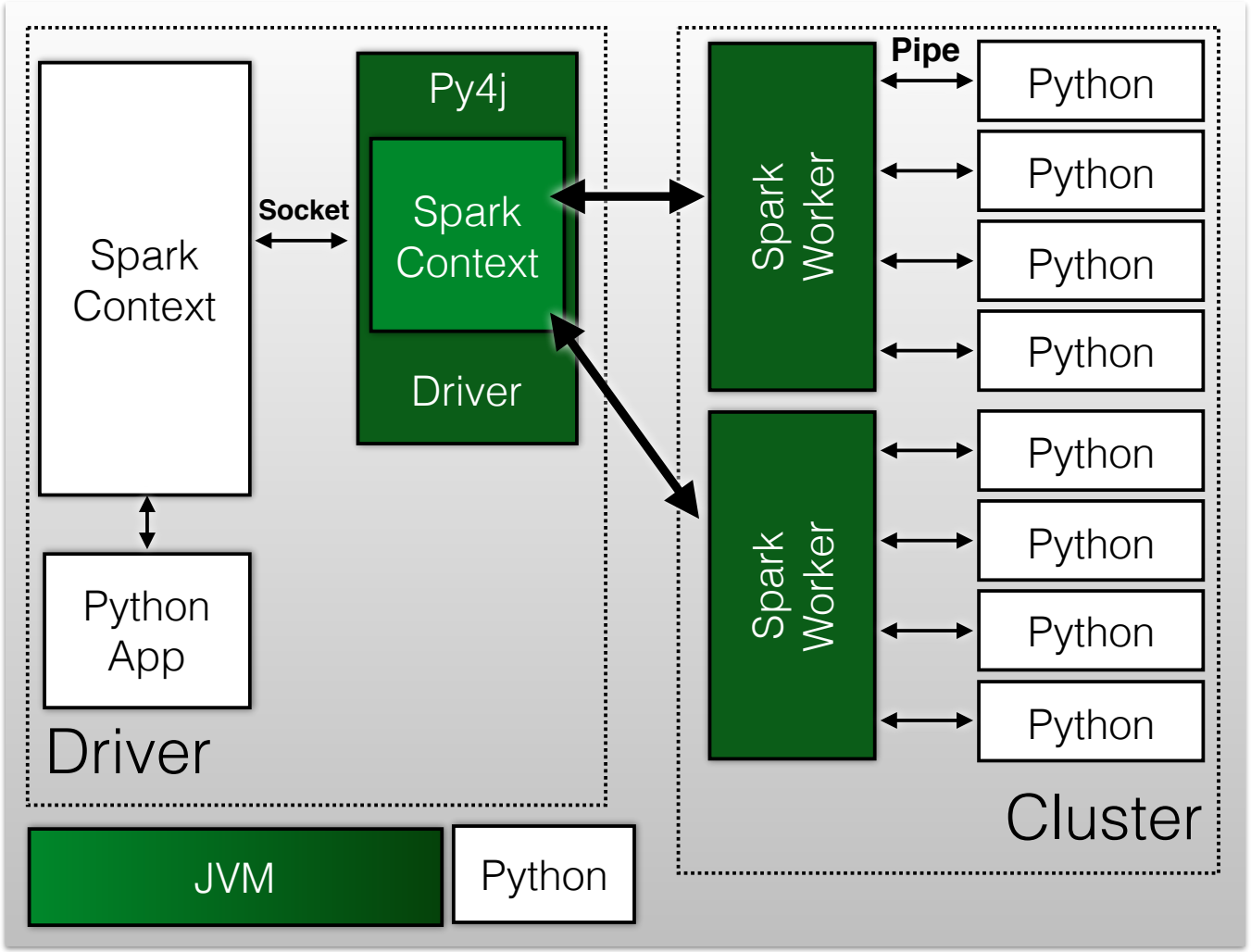
Spark SQL

- **Why another API?**
  - Performance

Spark: Java/Scala

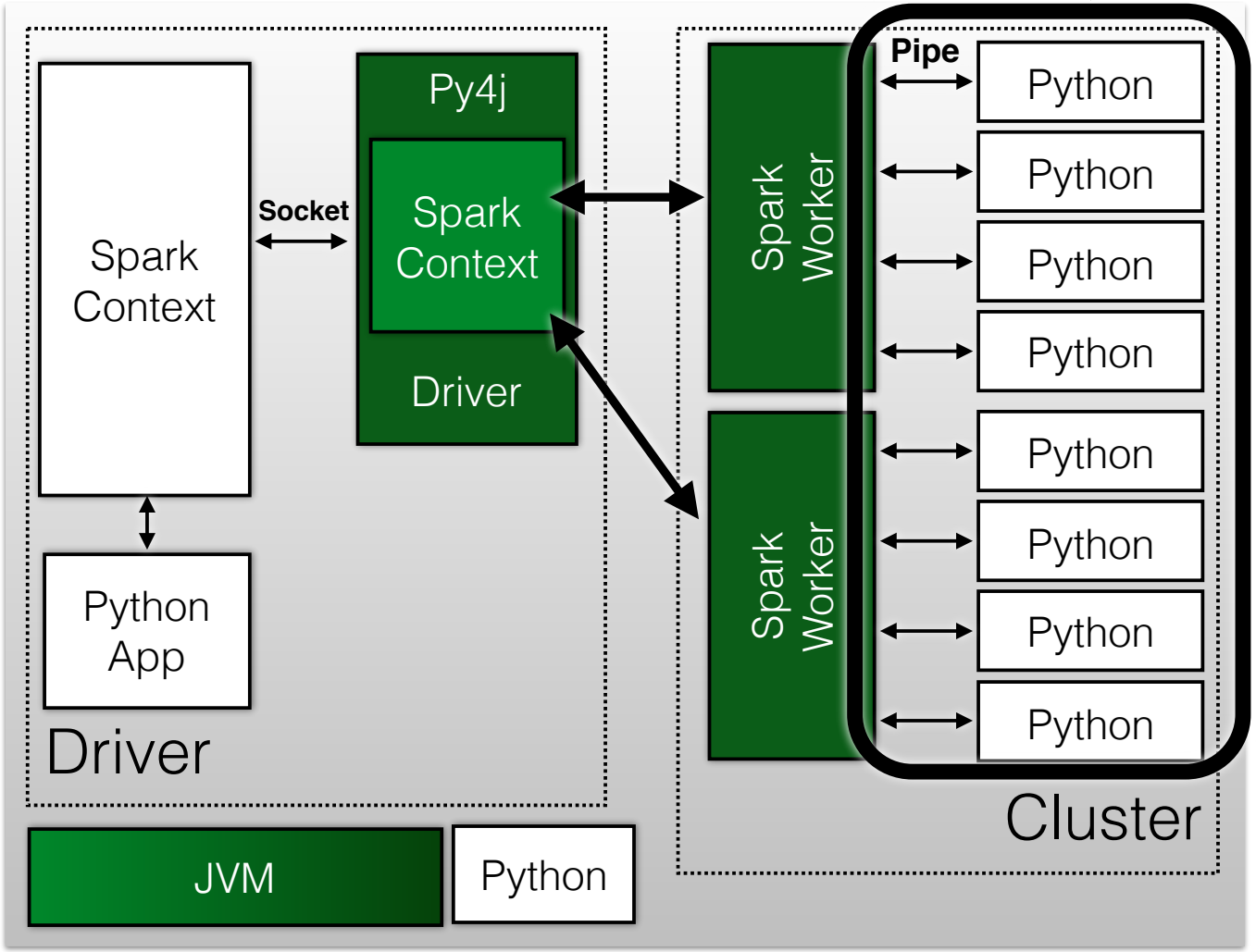


Pyspark


Spark Context
Socket
Py4j
Spark Context
Driver
Python App
Driver
Pipe
Spark Worker
Spark Worker
Python
Python
Python
Python
Python
Python
Python
Python
Cluster
JVM
Python

Pyspark

Python and pipe Overhead

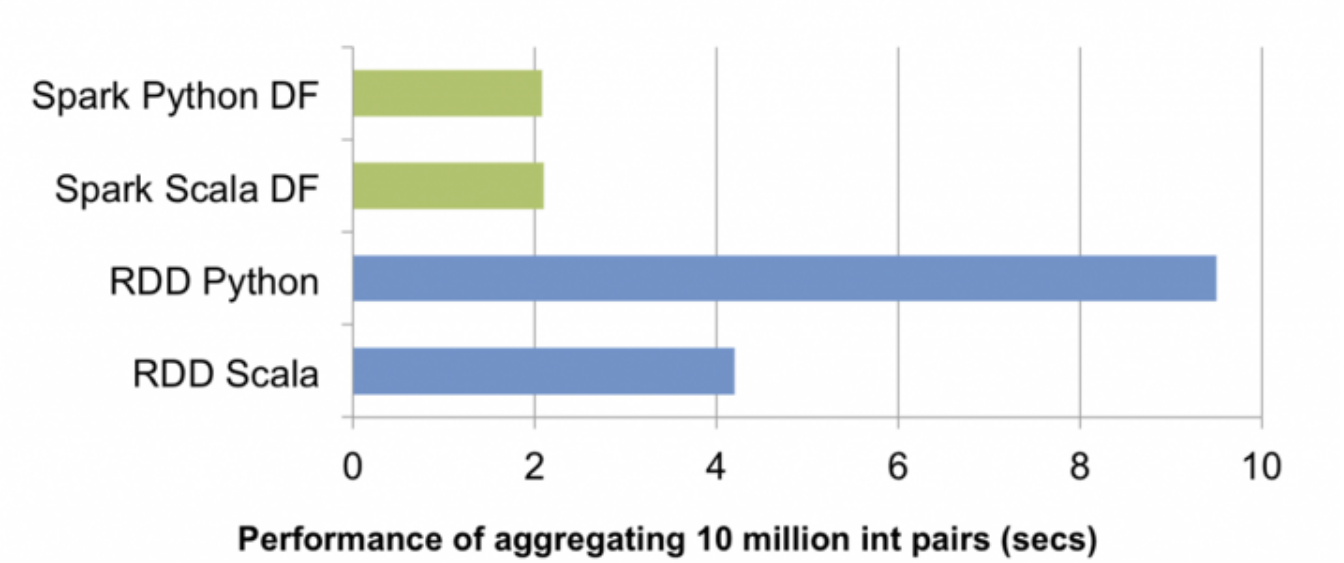


Pyspark: Performance

- Serialization/Deserialization overhead
- CPython / PyPy is officially supported.
  CPython still has most support since numpy is not yet supported in PyPy
- Python code performance issues if most time spent computing is not within native libraries
- **How can most of the headache of overhead be reduced?**

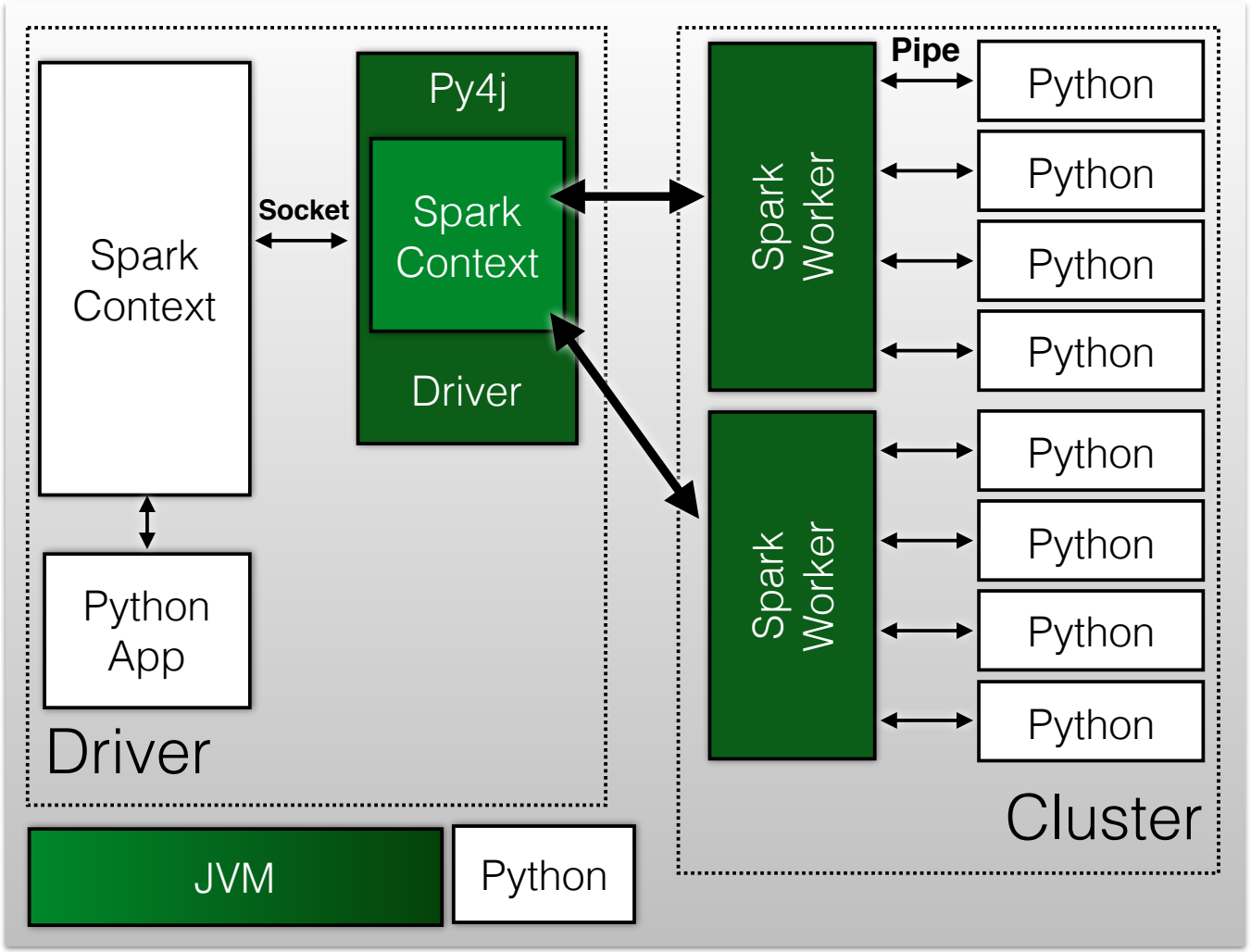
Pyspark SQL

- Optimized data processing using optimized data structures and spark code, no extra overhead.
- New in Spark 1.3.0: Dataframes (SQL)



Source: https://databricks.com/blog/2015/02/17/introducing-dataframes-in-spark-for-large-scale-data-science.html

Pyspark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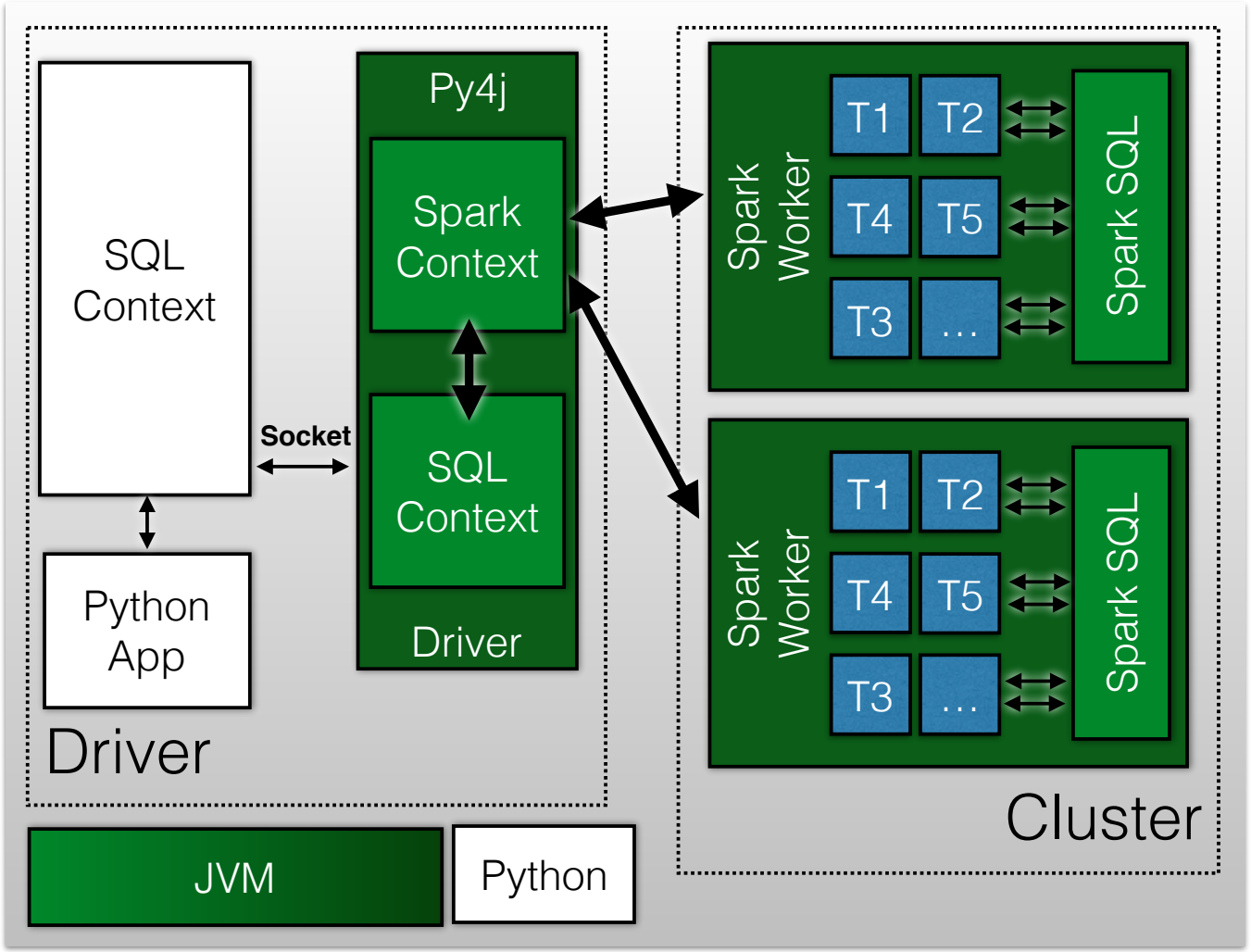
Pyspark SQL


SQL Context
Python App
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Py4j
Spark Context
SQL Context
Driver
JVM
Python
Spark Worker
T1
T2
T4
T5
T3
…
Spark SQL
Spark Worker
T1
T2
T4
T5
T3
…
Spark SQL
Cluster

Pyspark

No overhead
+ Native Spark SQL
Code only.