

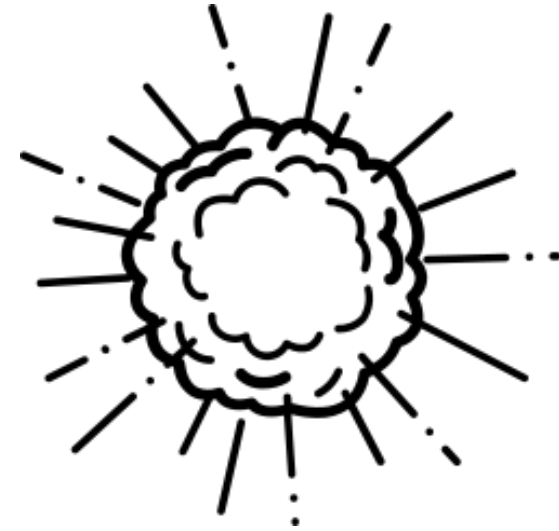
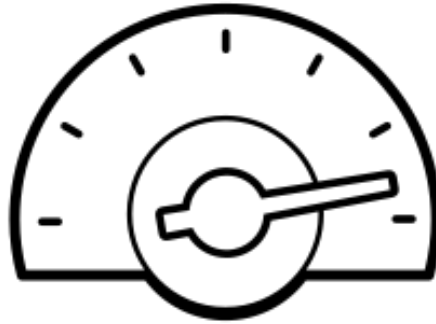


FIRE IN THE SKY

AN INTRODUCTION TO MONITORING APACHE SPARK IN THE CLOUD

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WHY MONITOR SPARK?



WHAT ABOUT LOGS?

```
spark-submit --master=spark://cluster:7077 app.py
```

```
17/10/13 13:33:03 INFO BlockManager: BlockManager stopped
17/10/13 13:33:03 INFO BlockManagerMaster: BlockManagerMaster stopped
17/10/13 13:33:03 INFO OutputCommitCoordinator$OutputCommitCoordinatorEndpoint: OutputCommitCoordinator stopped!
17/10/13 13:33:03 INFO SparkContext: Successfully stopped SparkContext
10.0.1.113 - - [13/Oct/2017 13:33:04] "GET /sparkpi?scale=1000 HTTP/1.1" 200 -
Traceback (most recent call last):
  File "/home/mike/workspace/github/radanalyticsio/tutorial-sparkpi-python-flask/app.py", line 41, in
    app.run(host='0.0.0.0', port=port)
  File "/home/mike/.venvs/sparkpi/lib/python2.7/site-packages/flask/app.py", line 841, in run
    run_simple(host, port, self, **options)
  File "/home/mike/.venvs/sparkpi/lib/python2.7/site-packages/werkzeug/serving.py", line 739, in run_simple
    inner()
  File "/home/mike/.venvs/sparkpi/lib/python2.7/site-packages/werkzeug/serving.py", line 702, in inner
    srv.serve_forever()
  File "/home/mike/.venvs/sparkpi/lib/python2.7/site-packages/werkzeug/serving.py", line 539, in serve_forever
    HTTPServer.serve_forever(self)
  File "/usr/lib64/python2.7/SocketServer.py", line 231, in serve_forever
    poll_interval)
  File "/usr/lib64/python2.7/SocketServer.py", line 150, in _eintr_retry
    return func(*args)
  File "/home/mike/opt/other-spark/python/lib/pyspark.zip/pyspark/context.py", line 236, in signal_handler
  File "/home/mike/opt/other-spark/python/lib/pyspark.zip/pyspark/context.py", line 962, in cancelAllJobs
AttributeError: 'NoneType' object has no attribute 'sc'
17/10/13 13:37:30 INFO ShutdownHookManager: Shutdown hook called
17/10/13 13:37:30 INFO ShutdownHookManager: Deleting directory /tmp/spark-c9989888-5190-4d70-9d20-5960ede510e4/pysp
17/10/13 13:37:30 INFO ShutdownHookManager: Deleting directory /tmp/spark-c9989888-5190-4d70-9d20-5960ede510e4
```

LET'S TALK METRICS

 `org.apache.spark.metrics.source.Source`



`"jvm.heap.used" : {"value": 124099768 }`



 `org.apache.spark.metrics.sink.Sink`

BASIC CONFIGURATION

metrics.properties

```
master.source.jvm.class=org.apache.spark.metrics.source.JvmSource
```

```
worker.source.jvm.class=org.apache.spark.metrics.source.JvmSource
```

```
driver.source.jvm.class=org.apache.spark.metrics.source.JvmSource
```

```
executor.source.jvm.class=org.apache.spark.metrics.source.JvmSource
```

METRICS SERVLET

GET /metrics/master/json/

```
{
  "gauges": {
    "jvm.PS-MarkSweep.count": {
      "value": 1
    },
    "jvm.PS-MarkSweep.time": {
      "value": 21
    },
    "jvm.PS-Scavenge.count": {
      "value": 3
    },
    "jvm.PS-Scavenge.time": {
      "value": 18
    },
    "jvm.heap.committed": {
      "value": 235405312
    }
  }
}
```

METRICS SERVLET

GET /metrics/applications/json/

GET /metrics/json/

CONSOLE SINK

metrics.properties

```
*.sink.console.class=org.apache.spark.metrics.sink.ConsoleSink
```

```
*.sink.console.period=5
```

```
*.sink.console.unit=seconds
```


CONSOLE SINK

```
10/12/17 4:59:54 PM =====  
  
-- Gauges -----  
jvm.PS-MarkSweep.count  
    value = 1  
jvm.PS-MarkSweep.time  
    value = 23  
jvm.PS-Scavenge.count  
    value = 4  
jvm.PS-Scavenge.time  
    value = 31  
jvm.heap.committed  
    value = 198705152  
jvm.heap.init  
    value = 253755392  
jvm.heap.max  
    value = 954728448  
jvm.heap.usage
```

SLF4J SINK

metrics.properties

```
*.sink.slf4j.class=org.apache.spark.metrics.sink.Slf4jSink  
  
*.sink.slf4j.period=5  
  
*.sink.slf4j.unit=seconds
```

SLF4J SINK

```
17/10/14 11:47:22 INFO Master: I have been elected leader! New state: ALIVE
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.PS-MarkSweep.count, value=1
17/10/14 11:47:25 INFO metrics: type=COUNTER, name=HiveExternalCatalog.fileCacheHits, count=0
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.PS-MarkSweep.time, value=20
17/10/14 11:47:25 INFO metrics: type=COUNTER, name=HiveExternalCatalog.filesDiscovered, count=0
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.PS-Scavenge.count, value=3
17/10/14 11:47:25 INFO metrics: type=COUNTER, name=HiveExternalCatalog.hiveClientCalls, count=0
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.PS-Scavenge.time, value=17
17/10/14 11:47:25 INFO metrics: type=COUNTER, name=HiveExternalCatalog.parallelListingJobCount, count=0
17/10/14 11:47:25 INFO metrics: type=COUNTER, name=HiveExternalCatalog.partitionsFetched, count=0
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.heap.committed, value=171442176
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.heap.init, value=253755392
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.heap.max, value=954728448
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.heap.usage, value=0.04117022393366454
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.heap.used, value=39306384
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.non-heap.committed, value=34996224
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.non-heap.init, value=2555904
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.non-heap.max, value=-1
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.non-heap.usage, value=-3.4380496E7
17/10/14 11:47:25 INFO metrics: type=HISTOGRAM, name=CodeGenerator.compilationTime, count=0, min=0, max=
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.non-heap.used, value=34381136
17/10/14 11:47:25 INFO metrics: type=HISTOGRAM, name=CodeGenerator.generatedClassSize, count=0, min=0,
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.pools.Code-Cache.committed, value=5111808
17/10/14 11:47:25 INFO metrics: type=HISTOGRAM, name=CodeGenerator.generatedMethodSize, count=0, min=0,
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.pools.Code-Cache.init, value=2555904
17/10/14 11:47:25 INFO metrics: type=HISTOGRAM, name=CodeGenerator.sourceCodeSize, count=0, min=0, max=
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.pools.Code-Cache.max, value=251658240
17/10/14 11:47:25 INFO metrics: type=GAUGE, name=jvm.pools.Code-Cache.usage, value=0.019977823893229166
```

CSV SINK

metrics.properties

```
*.sink.csv.class=org.apache.spark.metrics.sink.CsvSink  
  
*.sink.csv.period=1  
  
*.sink.csv.unit=seconds  
  
*.sink.csv.directory=/tmp/spark/csv/master/
```

CSV SINK

```
[mike@opb-ultra] /tmp/spark/csv/master
$ ls
application.PythonPi.1507910958999.cores.csv
application.PythonPi.1507910958999.runtime_ms.csv
application.PythonPi.1507910958999.status.csv
CodeGenerator.compilationTime.csv
CodeGenerator.generatedClassSize.csv
CodeGenerator.generatedMethodSize.csv
CodeGenerator.sourceCodeSize.csv
HiveExternalCatalog.fileCacheHits.csv
HiveExternalCatalog.filesDiscovered.csv
HiveExternalCatalog.hiveClientCalls.csv
HiveExternalCatalog.parallelListingJobCount.csv
HiveExternalCatalog.partitionsFetched.csv
jvm.heap.committed.csv
jvm.heap.init.csv
jvm.heap.max.csv
jvm.heap.usage.csv
jvm.heap.used.csv
jvm.non-heap.committed.csv
```

CSV SINK

jvm.PS-MarkSweep.count.csv

```
t,value
1507910949,1
1507910950,1
1507910951,1
1507910952,1
1507910953,1
1507910954,1
1507910955,1
1507910956,1
1507910957,1
1507910958,1
1507910959,1
1507910960,1
1507910961,1
1507910962,1
1507910963,1
1507910964,1
```

JMX SINK

metrics.properties

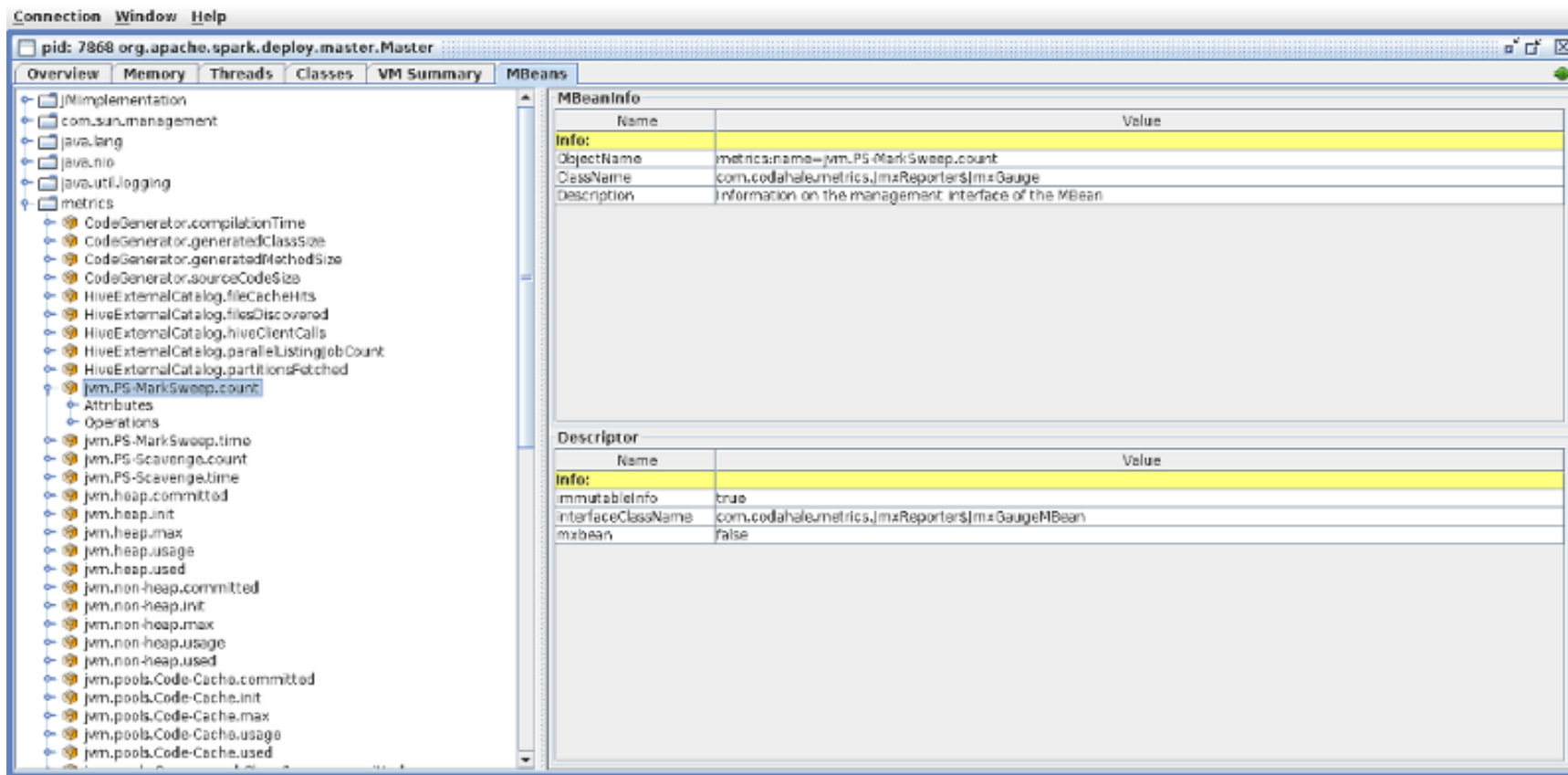
```
*.sink.jmx.class=org.apache.spark.metrics.sink.JmxSink
```

spark-defaults.conf

```
spark.driver.extraJavaOptions \  
    -Dcom.sun.management.jmxremote  
    -Dcom.sun.management.jmxremote.authenticate=false  
    -Dcom.sun.management.jmxremote.ssl=false  
    -Dcom.sun.management.jmxremote.port=19150  
    -Dcom.sun.management.jmxremote.local.only=false  
    -Djava.rmi.server.hostname=127.0.0.1  
    -Dcom.sun.management.jmxremote.rmi.port=19151
```

JMX SINK

jconsole



JMX SINK

Jolokia Java Agent



```
spark-class -javaagent:jolokia-jvm-agent.jar=port=19150,host=127.0.0.1
```

JMX SINK

GET /jolokia/

```
{
  "request": {
    "type": "version"
  },
  "status": 200,
  "timestamp": 1507946690,
  "value": {
    "agent": "1.3.7",
    "config": {
      "agentContext": "/jolokia",
      "agentId": "10.0.1.113-7868-4926097b-jvm",
      "agentType": "jvm",
      "debug": "false",
      "debugMaxEntries": "100",
      "discoveryEnabled": "true",
      "historyMaxEntries": "10",
      "maxCollectionSize": "0",
      "maxDepth": "15",
      "maxObjects": "0"
    },
    "info": {
      "product": "jetty",
      "vendor": "Mortbay",
      "version": "6.1.26"
    },
    "protocol": "7.2"
  }
}
```

JMX SINK

GET /jolokia/read/metrics:name=jvm.PS-MarkSweep.count

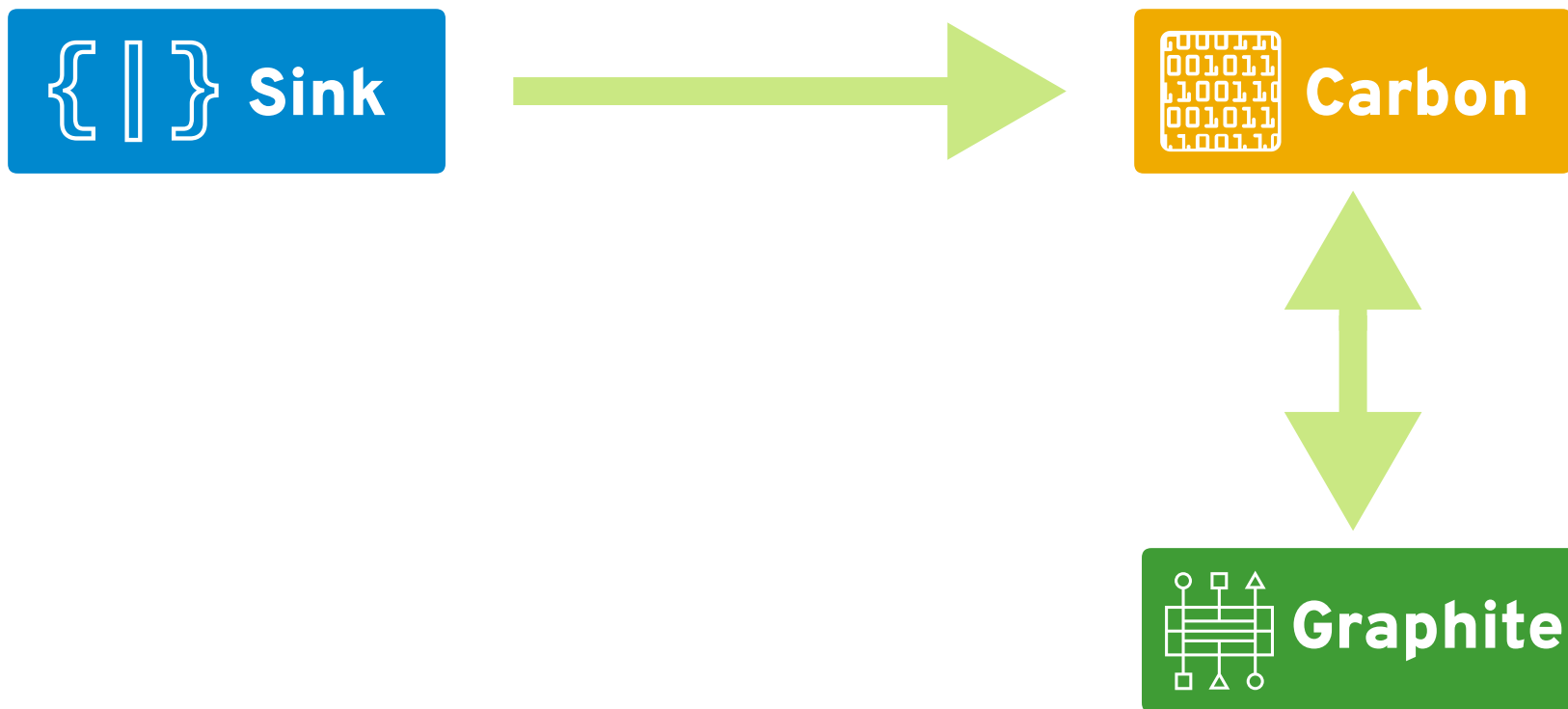
```
{
  "request": {
    "mbean": "metrics:name=jvm.PS-MarkSweep.count",
    "type": "read"
  },
  "status": 200,
  "timestamp": 1507946213,
  "value": {
    "Value": 1
  }
}
```

GRAPHITE SINK

metrics.properties

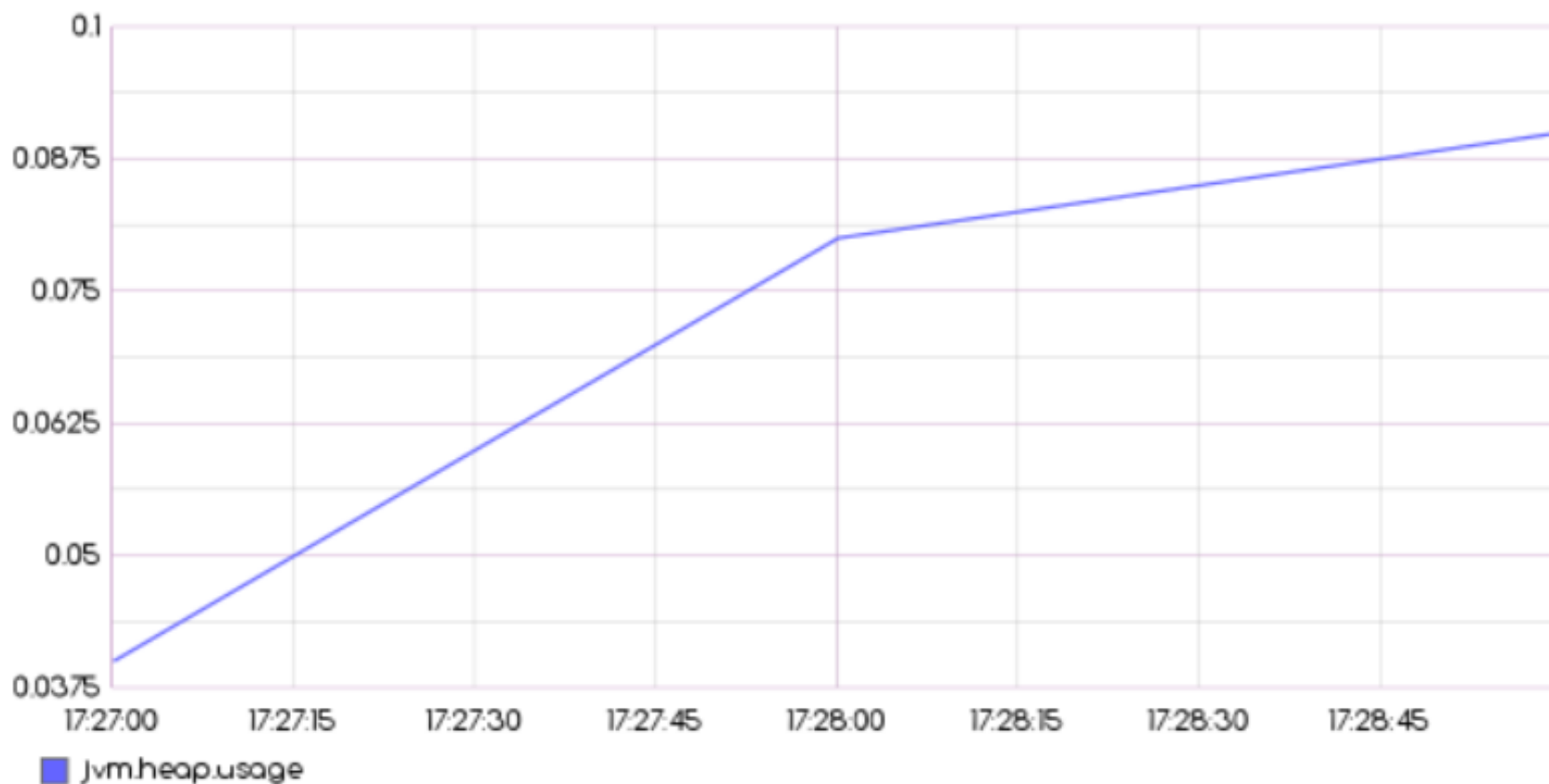
```
*.sink.graphite.class=org.apache.spark.metrics.sink.GraphiteSink  
  
*.sink.graphite.host=127.0.0.1  
  
*.sink.graphite.port=2003  
  
*.sink.graphite.period=1  
  
*.sink.graphite.unit=seconds
```

GRAPHITE SINK



GRAPHITE SINK

`/render?target=jvm.heap.usage&from=-3minutes`



GRAPHITE SINK

/metrics/index.json

```
[  
  "jvm.PS-MarkSweep.count",  
  "jvm.PS-MarkSweep.time",  
  "jvm.PS-Scavenge.count",  
  "jvm.PS-Scavenge.time",  
  "jvm.heap.committed",  
  "jvm.heap.init",  
  "jvm.heap.max",  
  "jvm.heap.usage",  
  "jvm.heap.used",  
  "jvm.non-heap.committed",  
  "jvm.non-heap.init",  
  "jvm.non-heap.max",  
  "jvm.non-heap.usage",  
  "jvm.non-heap.used",  
  "jvm.pools.Code-Cache.committed",
```

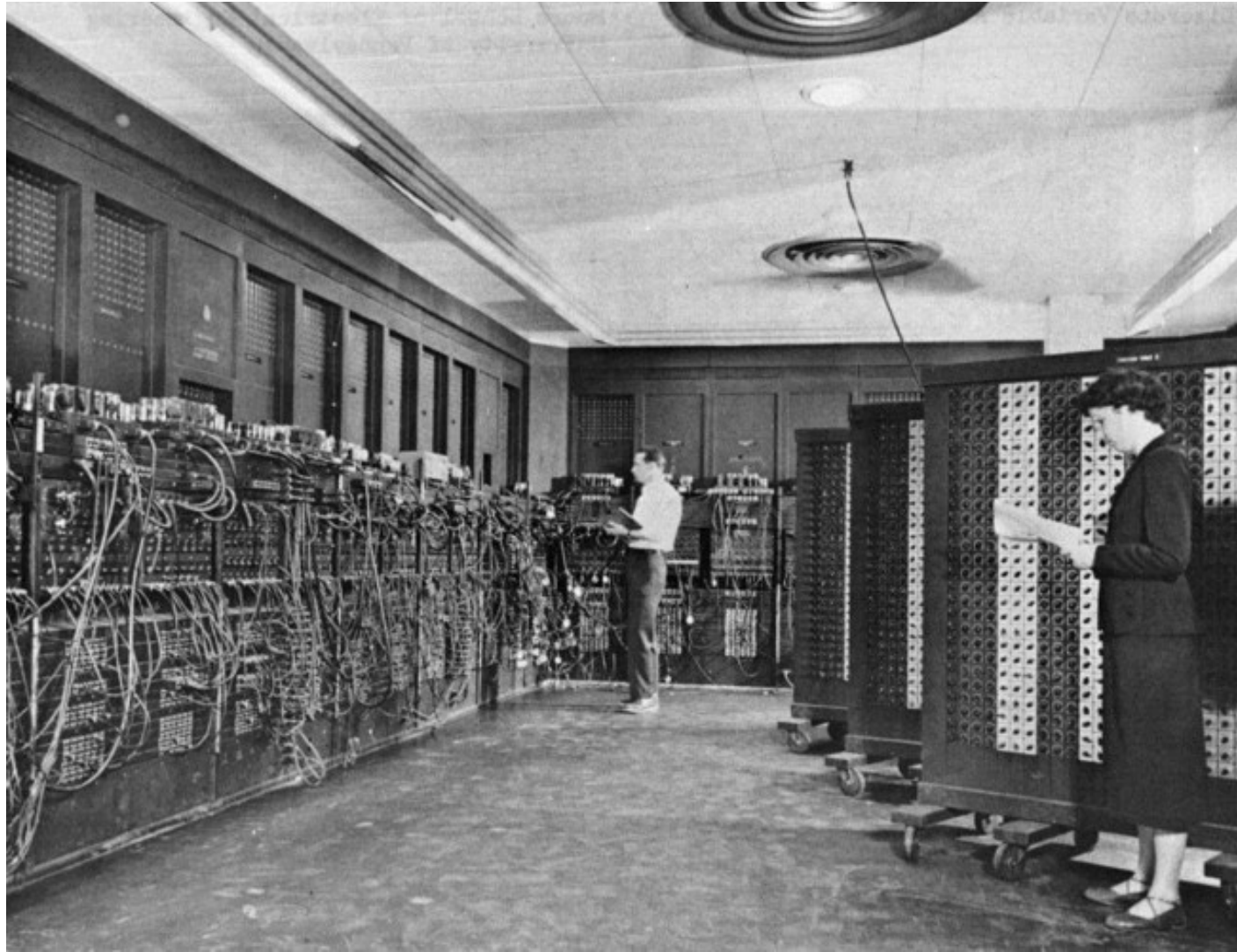
GRAPHITE SINK

/render?target=jvm.PS-MarkSweep.count&format=json

```
[
  {
    "datapoints": [
      [
        null,
        1507947840
      ],
      [
        1.0,
        1507947900
      ],
      [
        1.0,
        1507947960
      ]
    ],
    "target": "jvm.PS-MarkSweep.count"
  }
]
```


MUCH MORE TO DISCOVER

```
app-*-*.driver.BlockManager.memory.*
app-*-*.driver.CodeGenerator.compilationTime.*
app-*-*.driver.CodeGenerator.generatedClassSize.*
app-*-*.driver.CodeGenerator.generatedMethodSize.*
app-*-*.driver.CodeGenerator.sourceCodeSize.*
app-*-*.driver.DAGScheduler.job.*
app-*-*.driver.DAGScheduler.messageProcessingTime.*
app-*-*.driver.DAGScheduler.stage.*
application.PythonPi.*.cores
application.PythonPi.*.runtime_ms
jvm.total.committed
jvm.total.init
jvm.total.max
jvm.total.used
worker.coresFree
worker.coresUsed
worker.executors
worker.memFree_MB
```

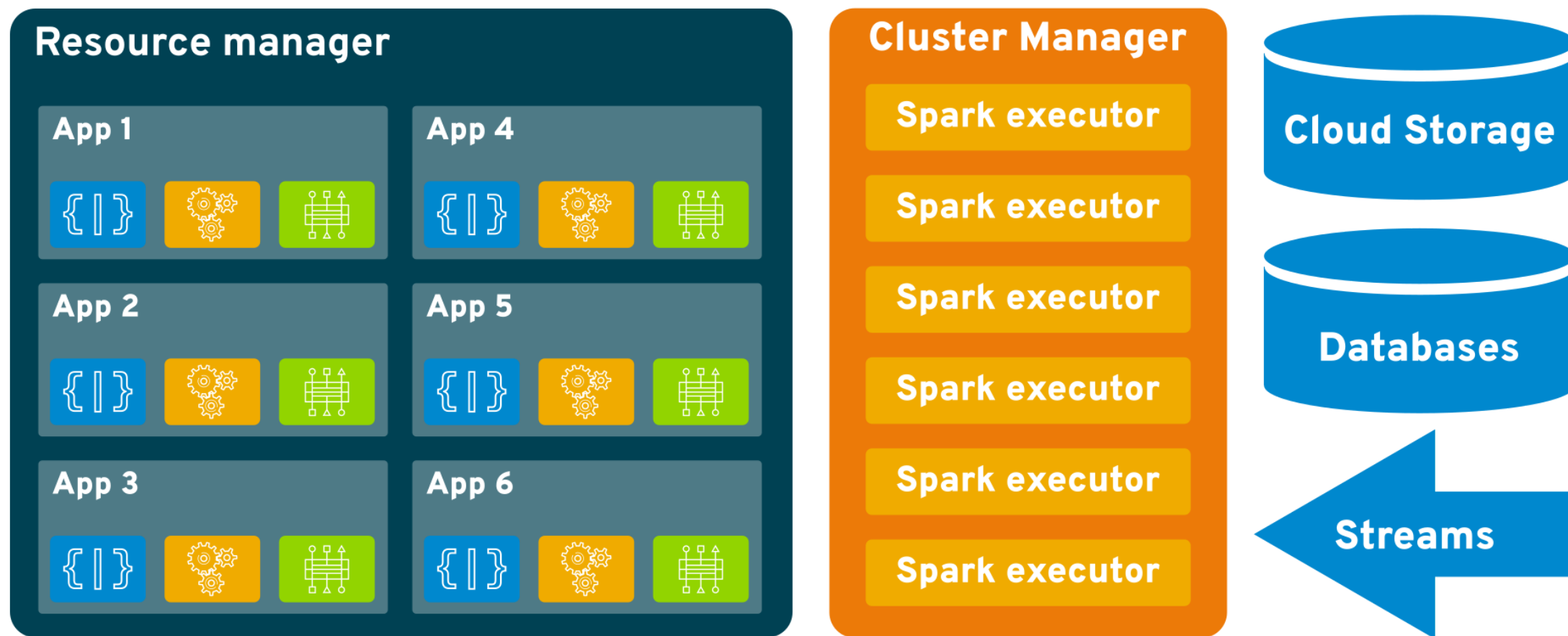


WHAT IS CLOUD NATIVE?

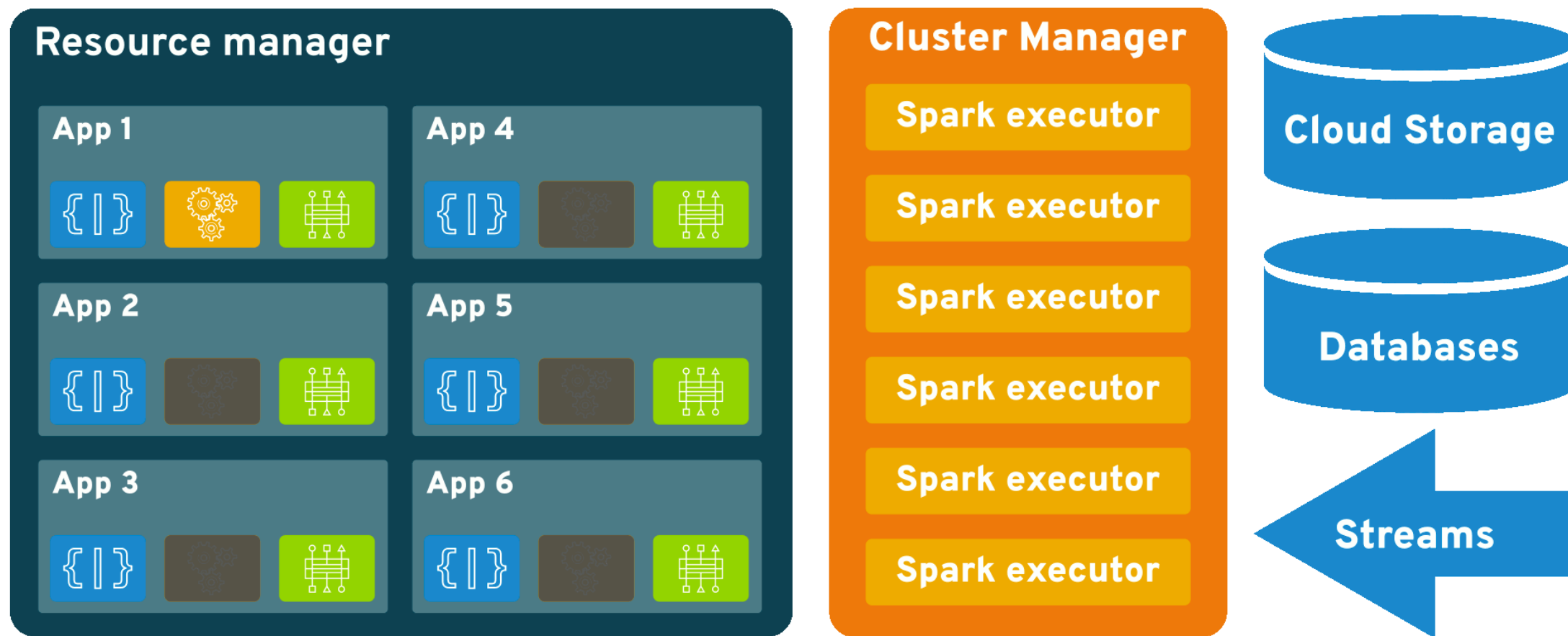


- Containerized
- Dynamically orchestrated
- Microservice oriented
- **cncf.io/about/faq**

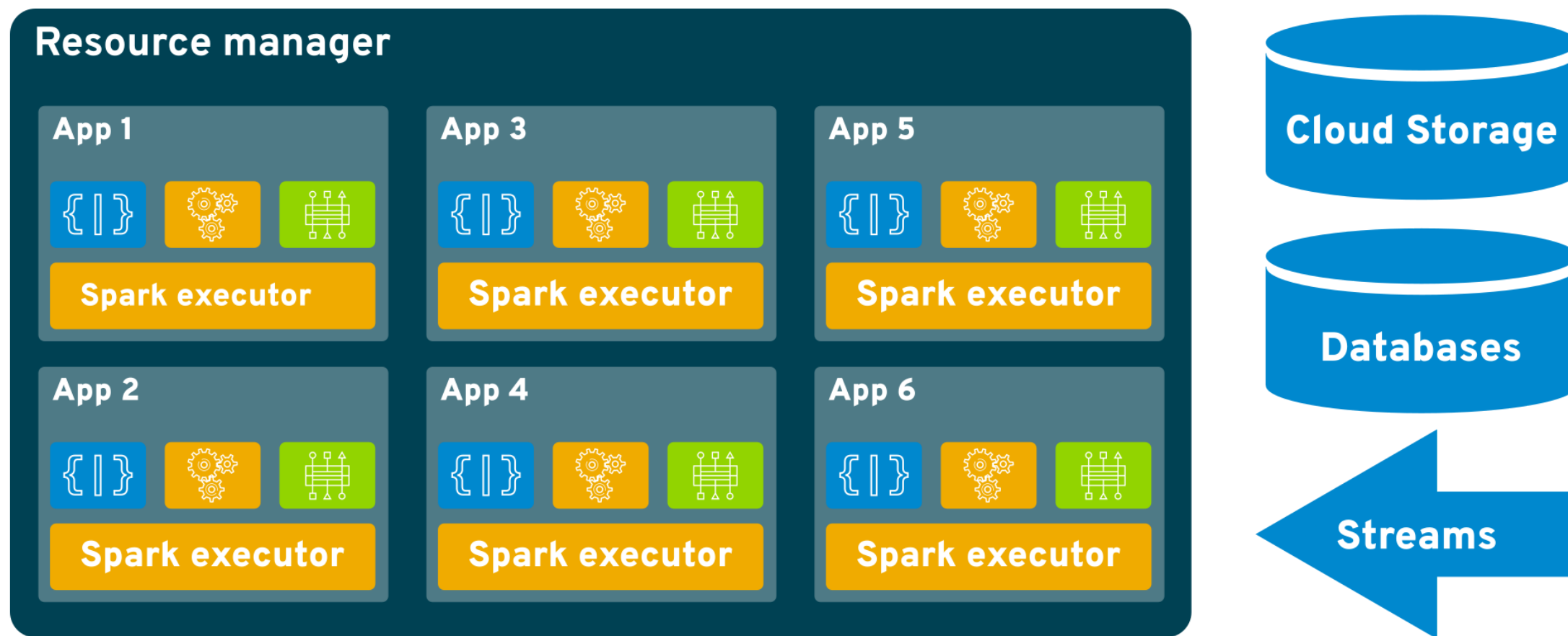
TRADITIONAL ORCHESTRATION



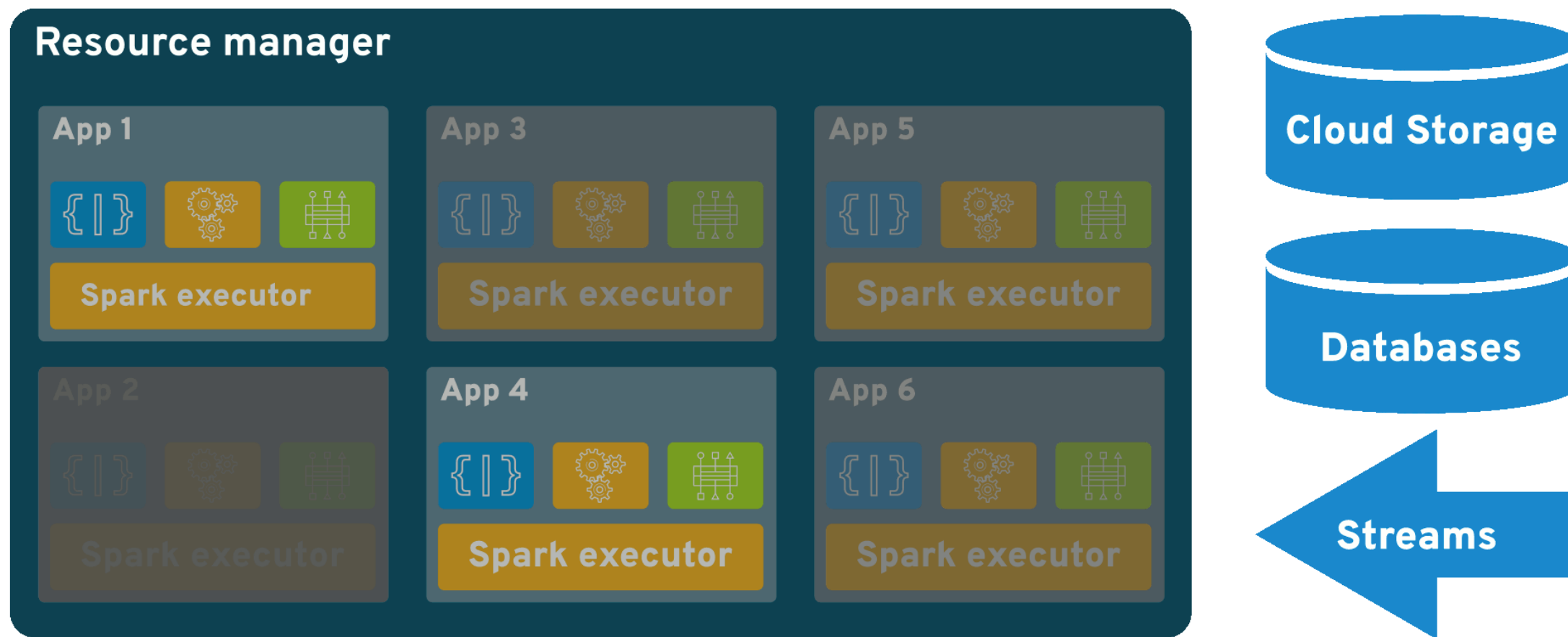
TRADITIONAL ORCHESTRATION



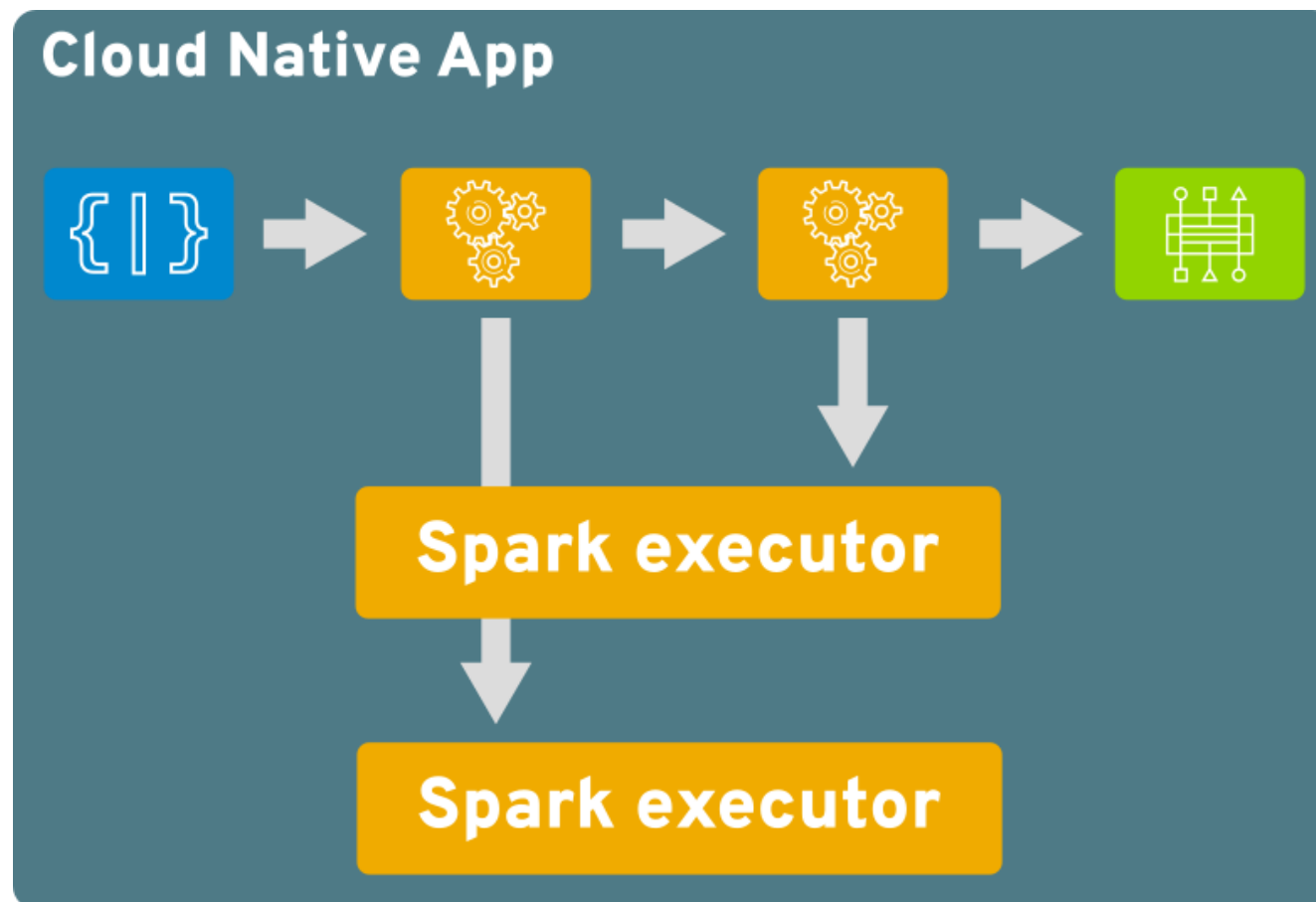
CLOUD NATIVE ORCHESTRATION



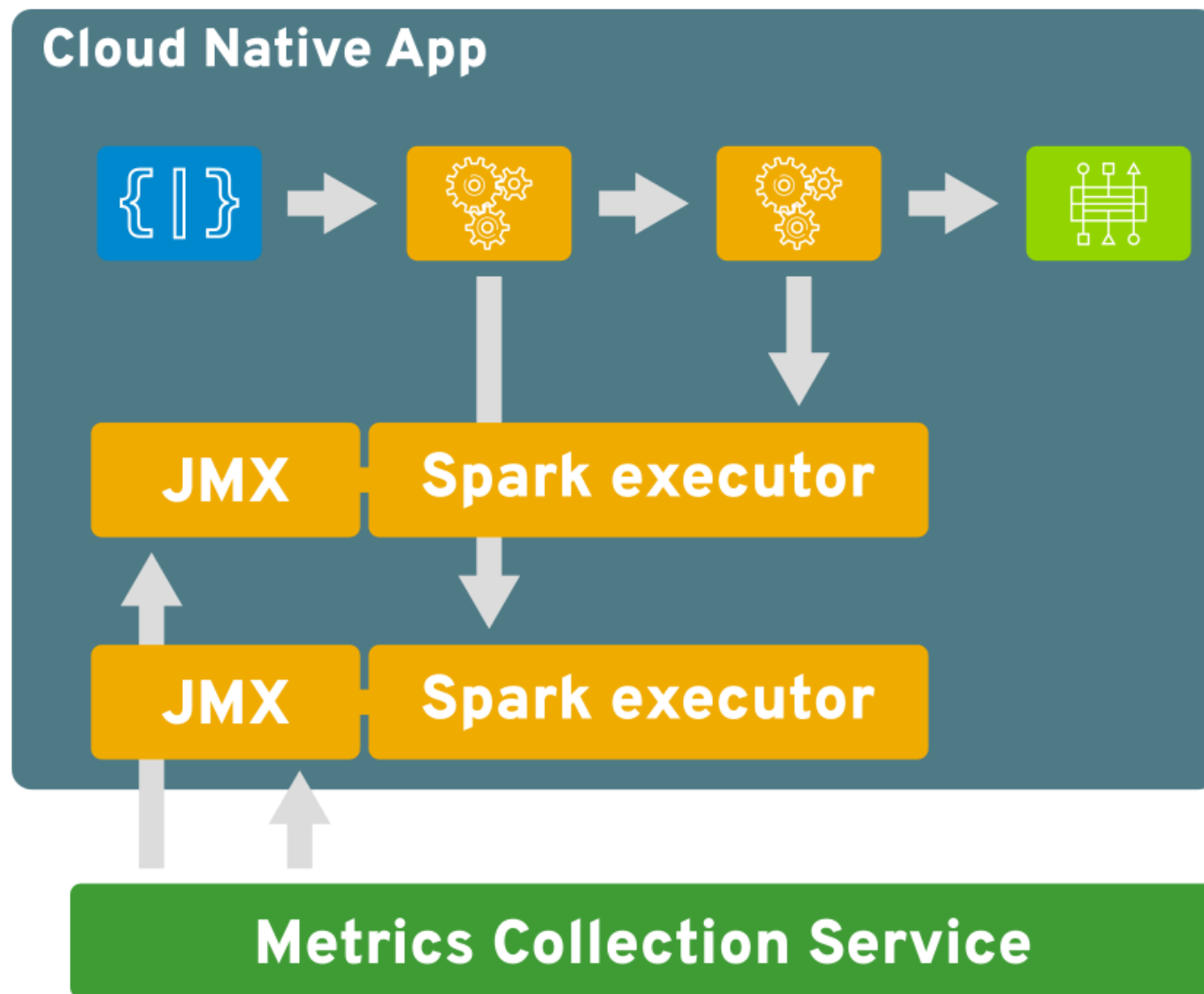
CLOUD NATIVE ORCHESTRATION



CLOUD MONITORING



SCRAPING



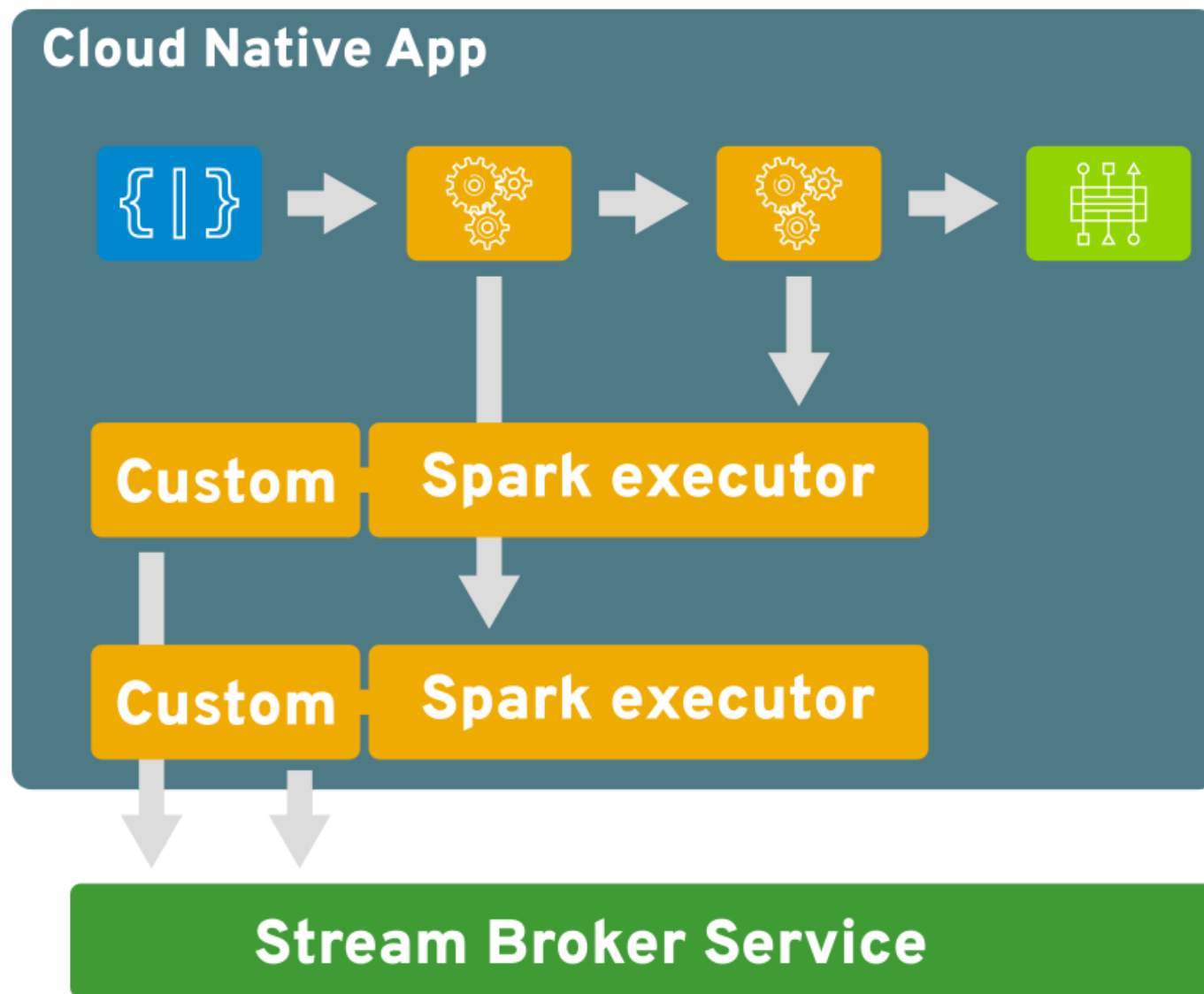
SCRAPING

🐙 **rhuss/jolokia**

🐙 **prometheus/jmx_exporter**

🐙 **fabric8io/agent-bond**

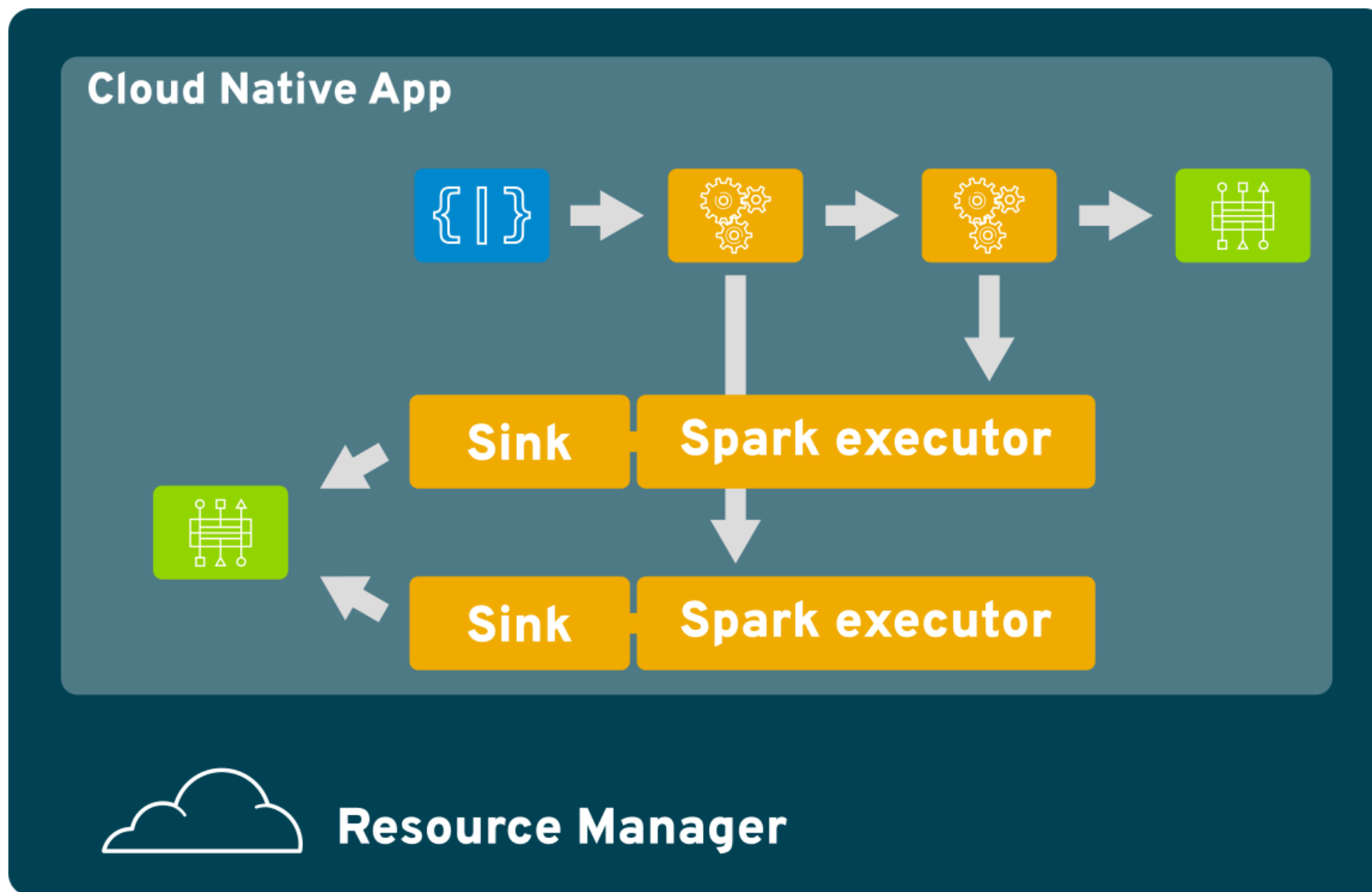
BROADCAST



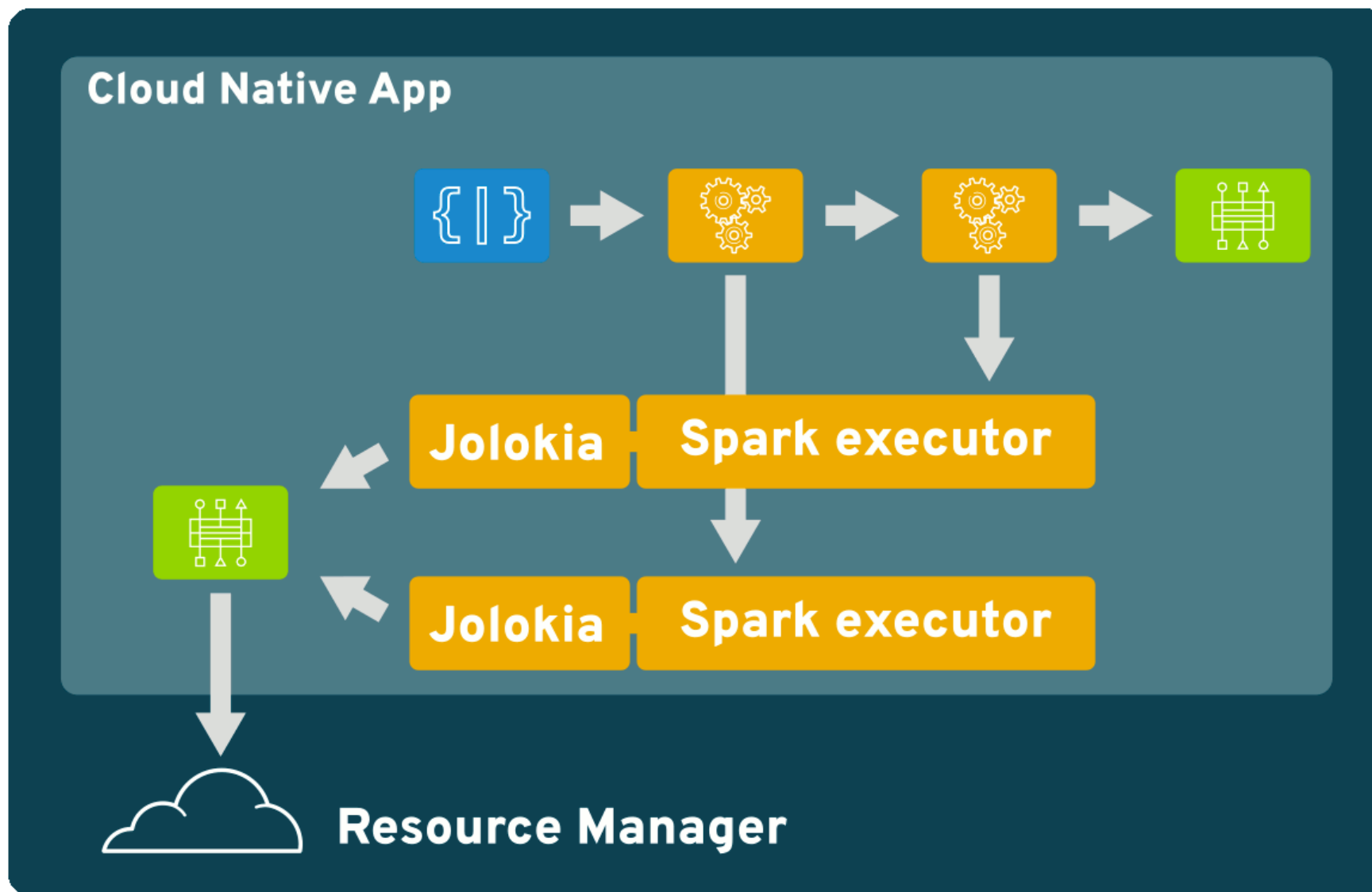
BROADCAST

 **erikerlandson/spark-kafka-sink**

HYBRID



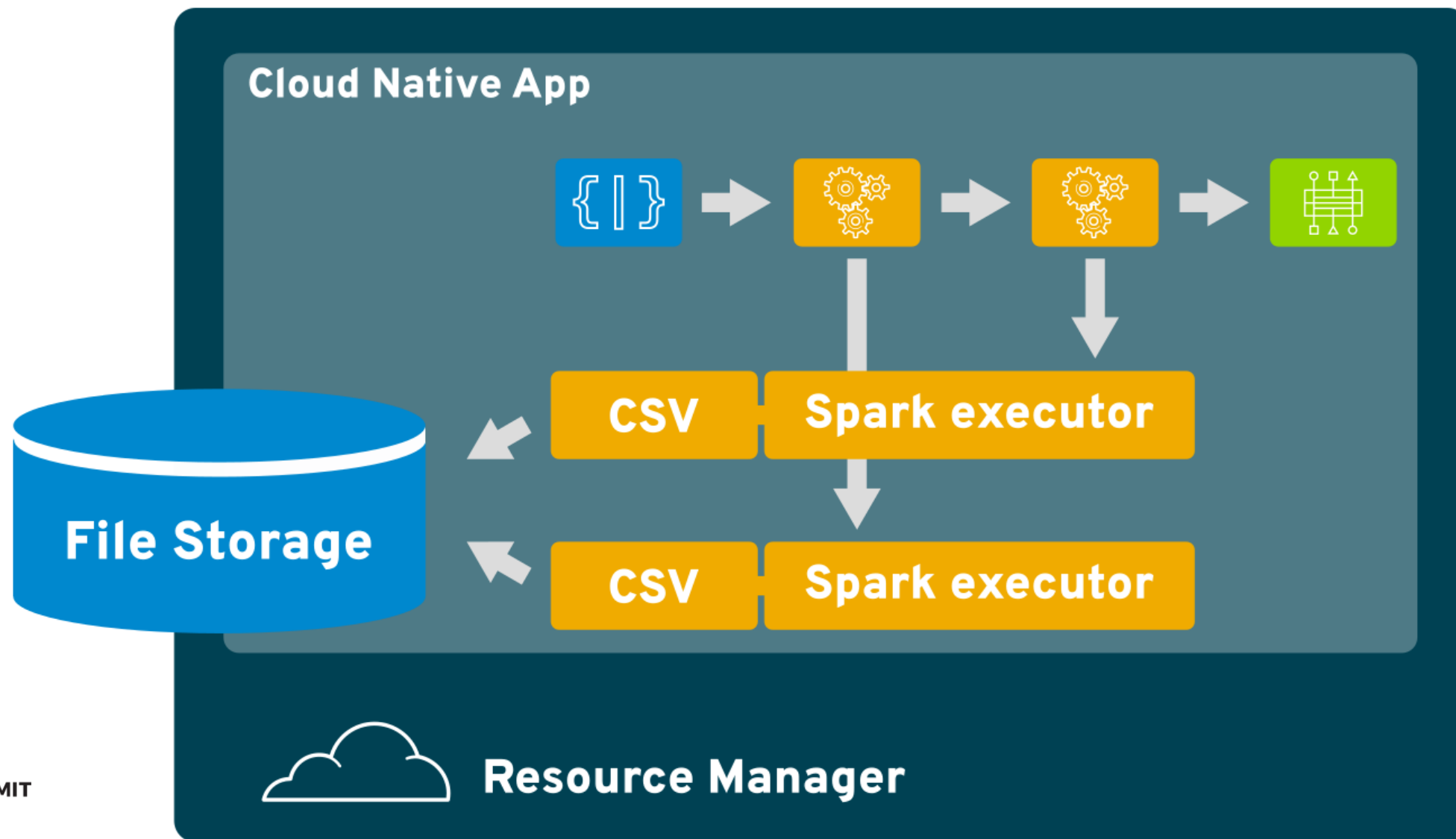
HYBRID



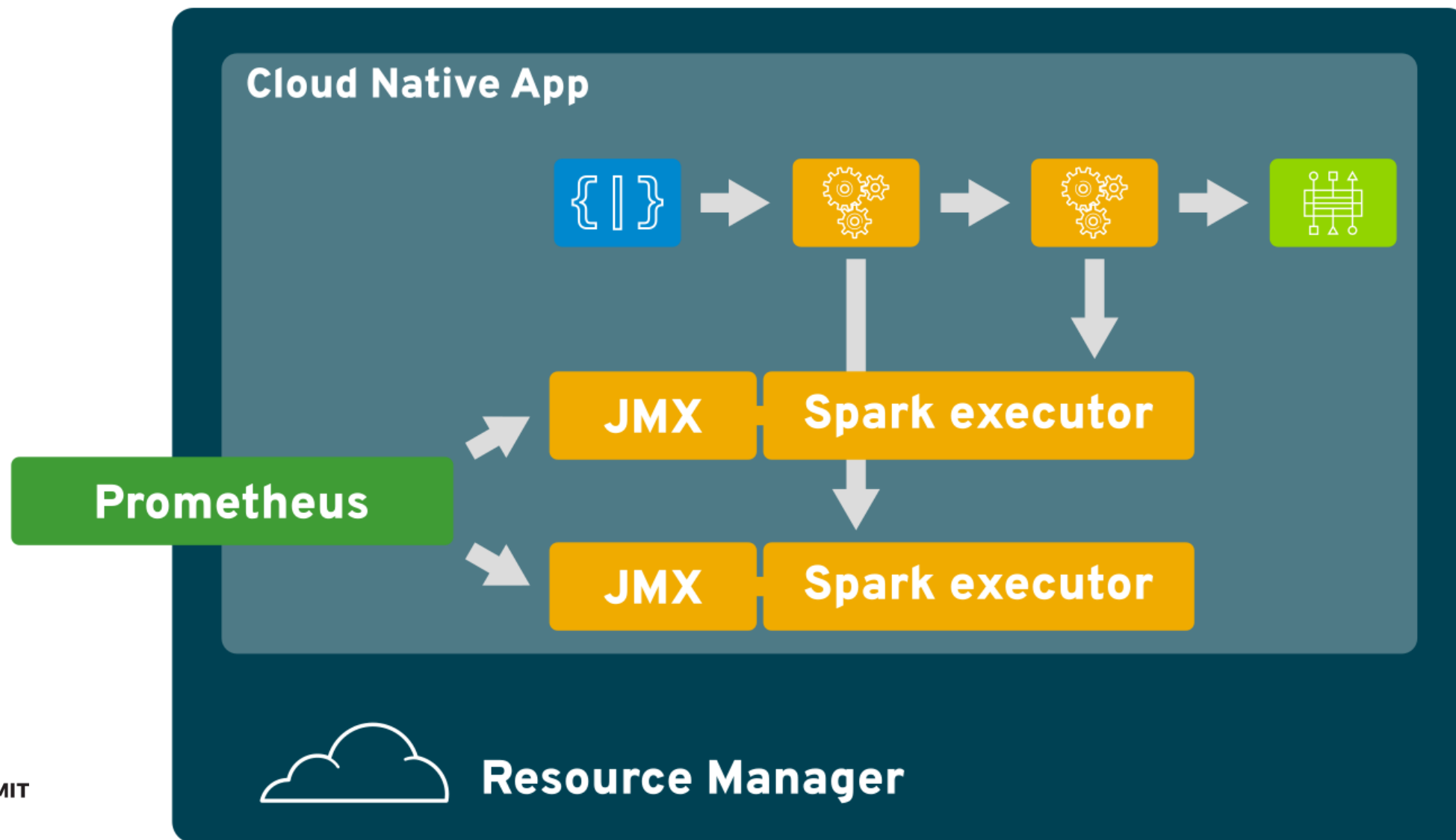
HYBRID

 **radanalyticsio/scorpion-stare**

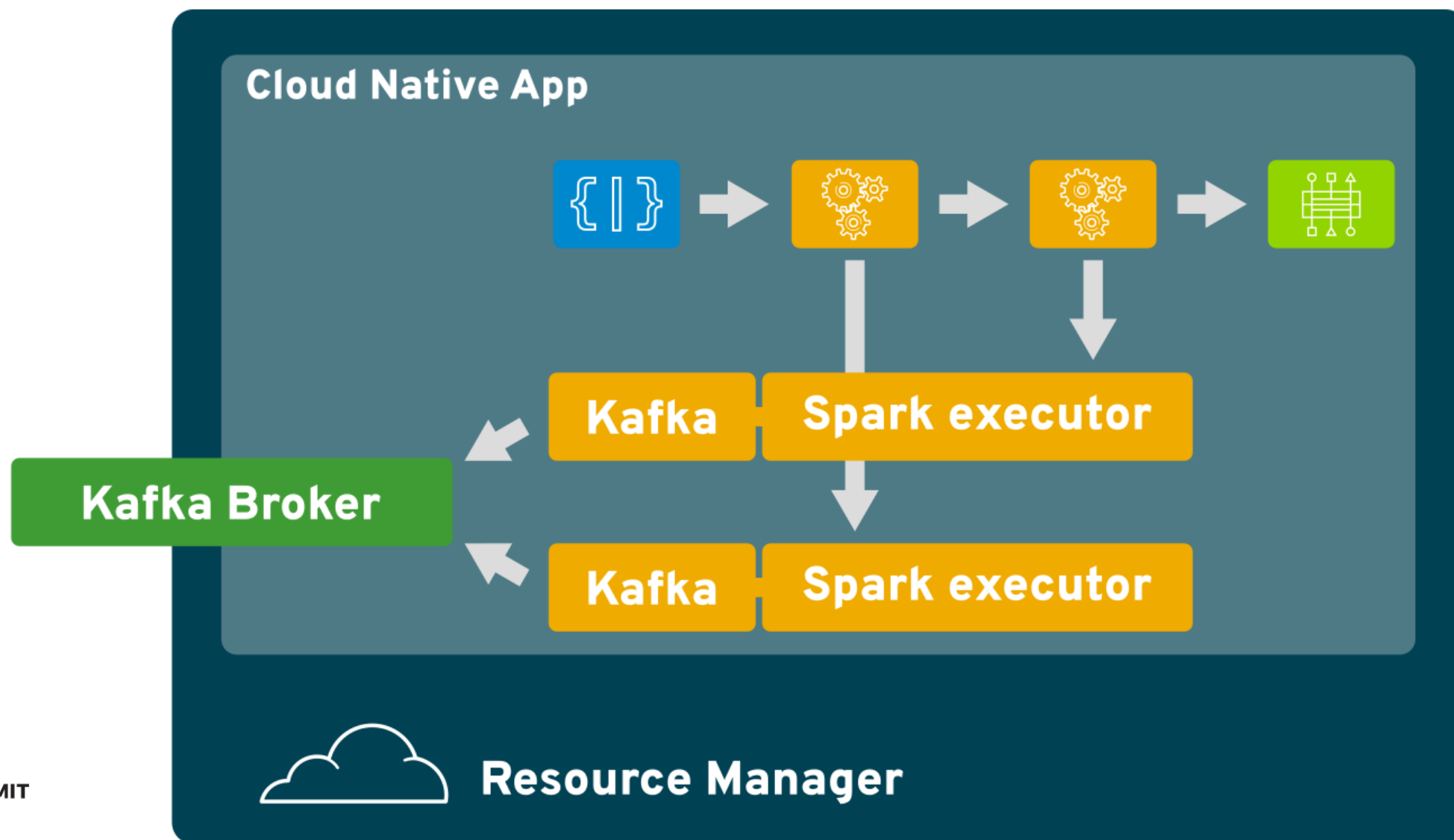
CHALLENGES



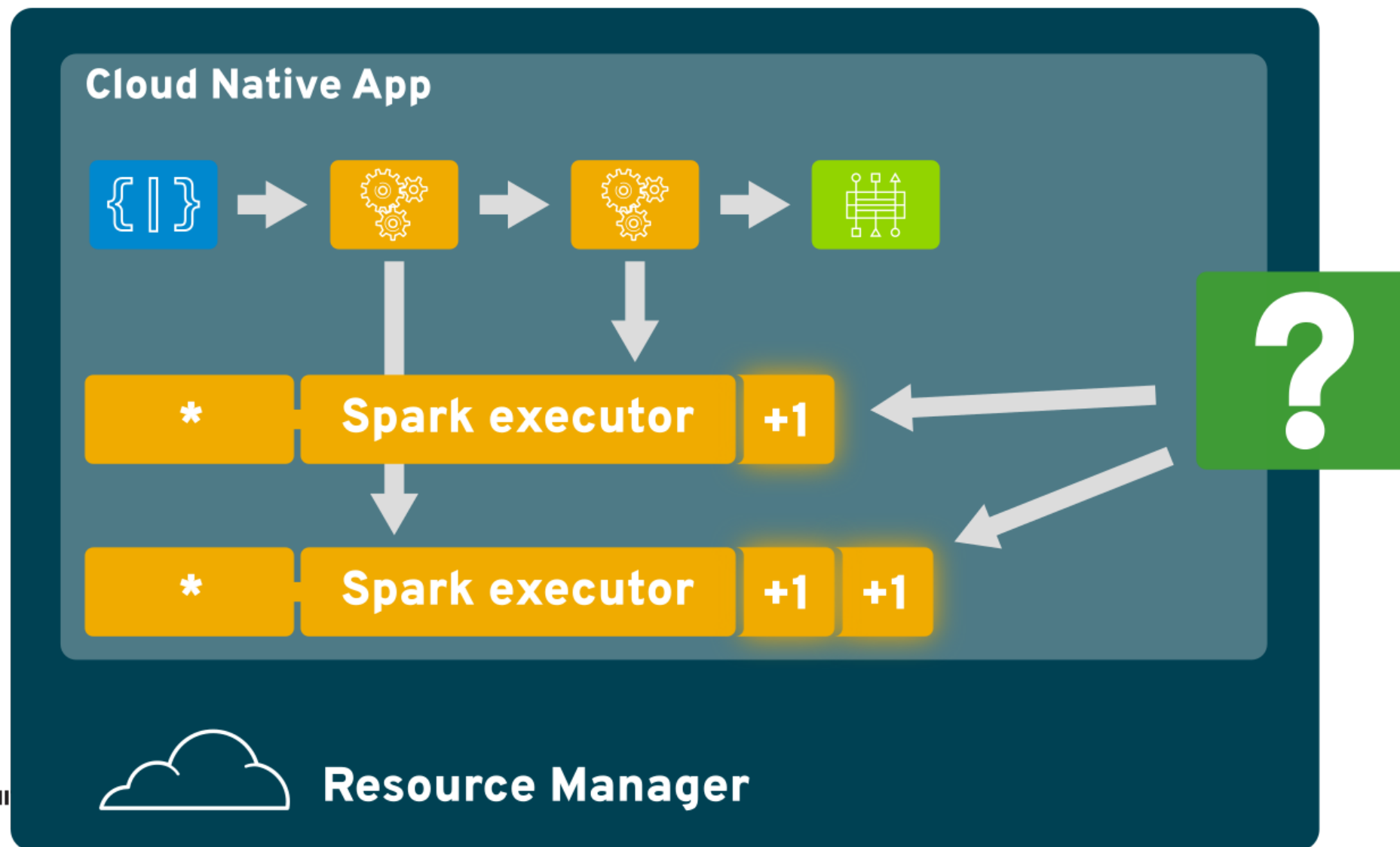
CHALLENGES



CHALLENGES



CHALLENGES



WHAT WILL YOU BUILD?



THANK YOU

STAY IN TOUCH

@FOSSjunkie

CHECK OUT OUR PROJECTS

<https://radanalytics.io>