YARN by default

(Spark on YARN)

Ferran Galí i Reniu

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About me

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BARCELONATECH
Facultat d'Informàtica de Barcelona

trovit

Spark meetup
BARCELONA

The Big Data problem

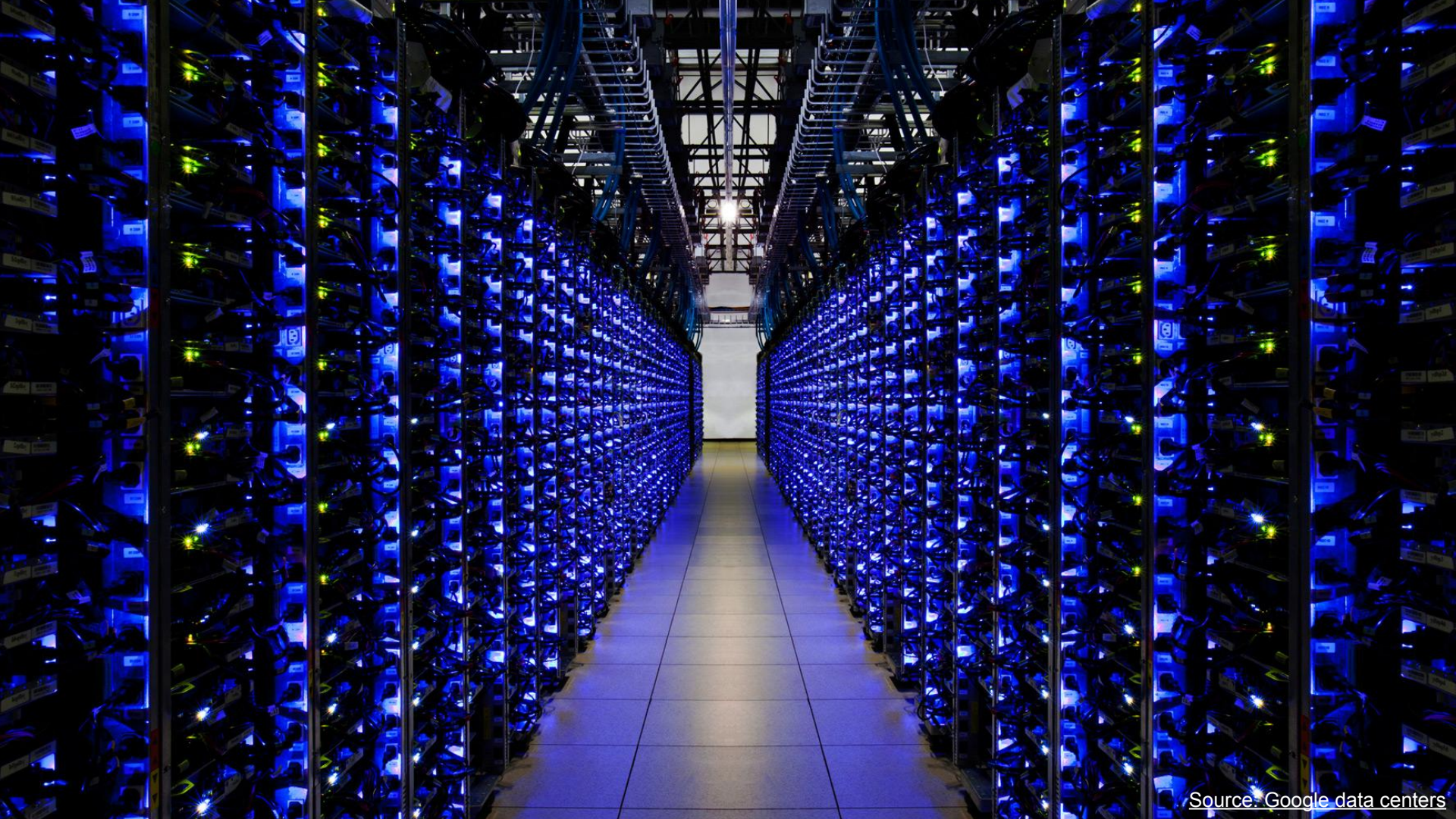
100 MB/s

2 TB = 3.5 hours

The Big Data problem

100 MB/s

2 TB = 30 min

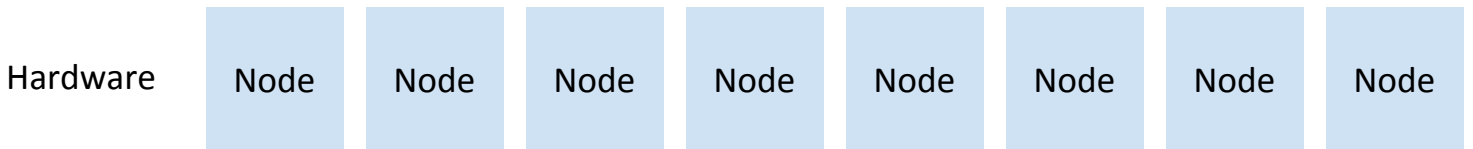


Source: Google data centers

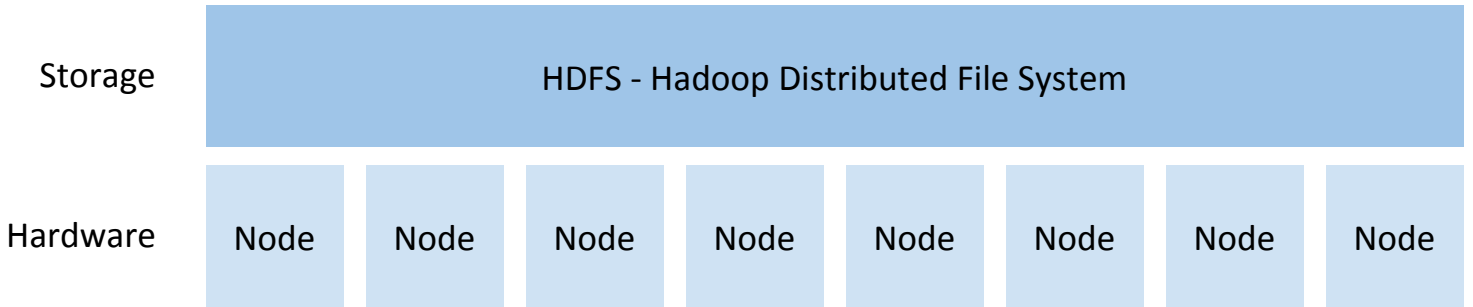

Distribute
All The Things!
ICANHASCHEEZBURGER.COM


hadoop

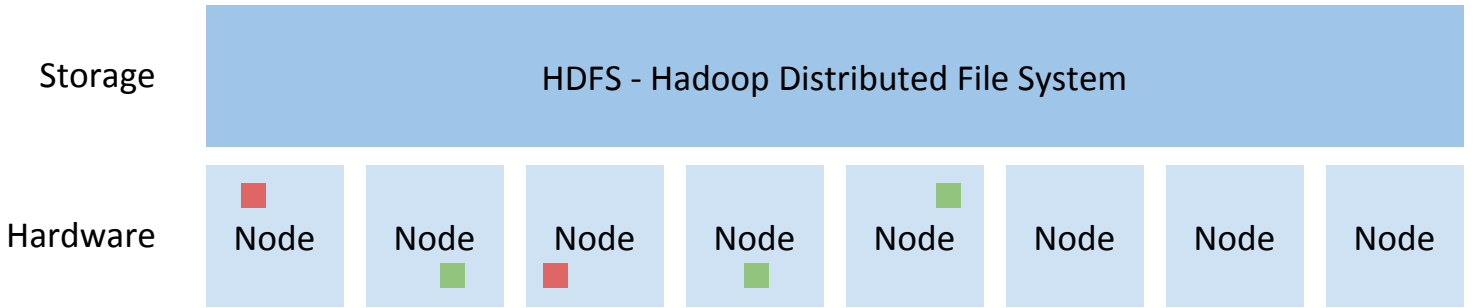
HDFS



HDFS


Storage
HDFS - Hadoop Distributed File System
Hardware
Node
Node
Node
Node
Node
Node
Node
Node

HDFS


Storage
HDFS - Hadoop Distributed File System
Hardware
Node
Node
Node
Node
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Node
Node
Node

HDFS

```
$> hadoop fs -ls
```

HDFS

```
$> hadoop fs -ls
     Found 2 items
     drwxr-xr-x   - hadoop supergroup          0 2015-06-11 11:27 dir
     -rw-r--r--   1 hadoop supergroup    2198927 2015-06-10 17:22 file1.txt
$>
```

HDFS

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$> hadoop fs -ls dir
     Found 2 items
     -rw-r--r--   1 hadoop supergroup    2198927 2015-06-10 17:22 dir/file2.txt
     -rw-r--r--   1 hadoop supergroup    2198927 2015-06-10 17:22 dir/file3.txt
$>
```

HDFS

```
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     Found 2 items
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$> hadoop fs -cat dir/file3.txt
```

HDFS

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     Found 2 items
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     -rw-r--r--   1 hadoop supergroup    2198927 2015-06-10 17:22 dir/file3.txt
$> hadoop fs -cat dir/file3.txt
line1
line2
line3
line4
line5
```
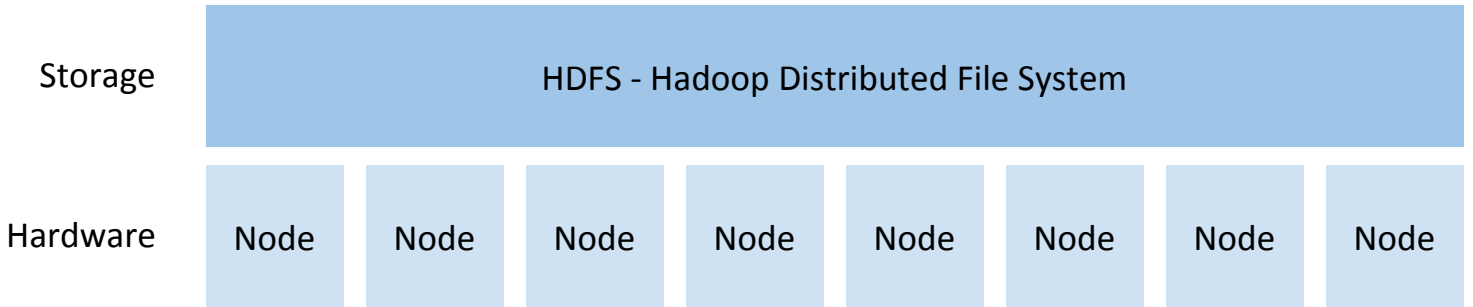

MapReduce


Storage
HDFS - Hadoop Distributed File System
Hardware
Node
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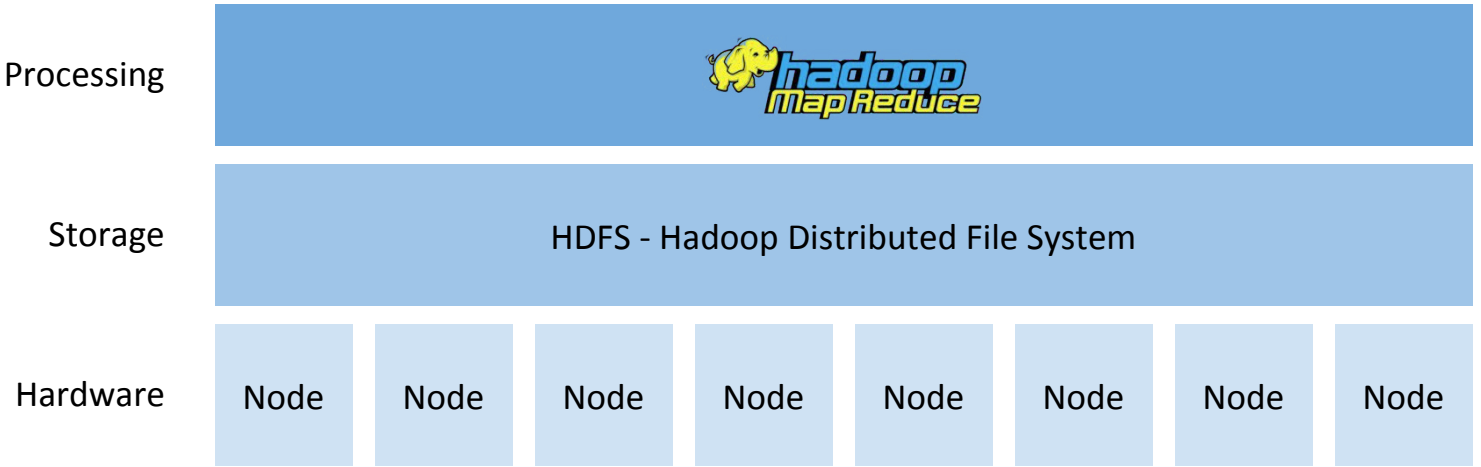
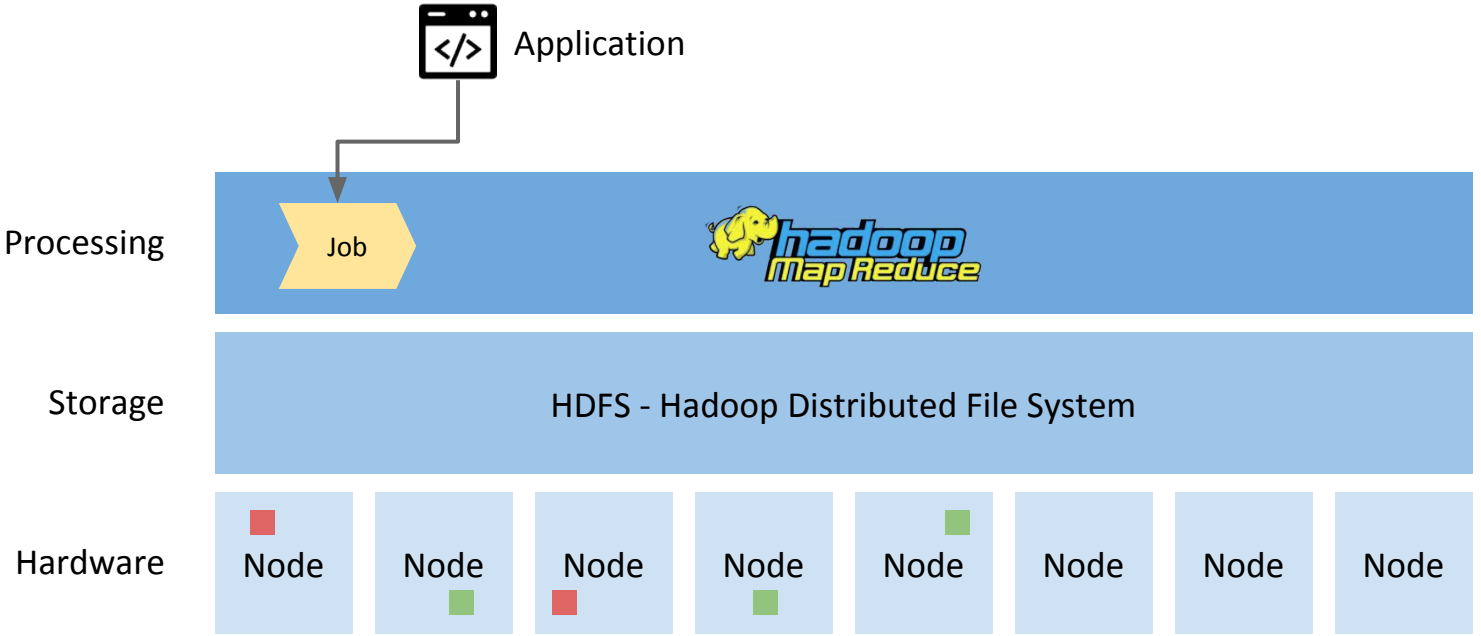
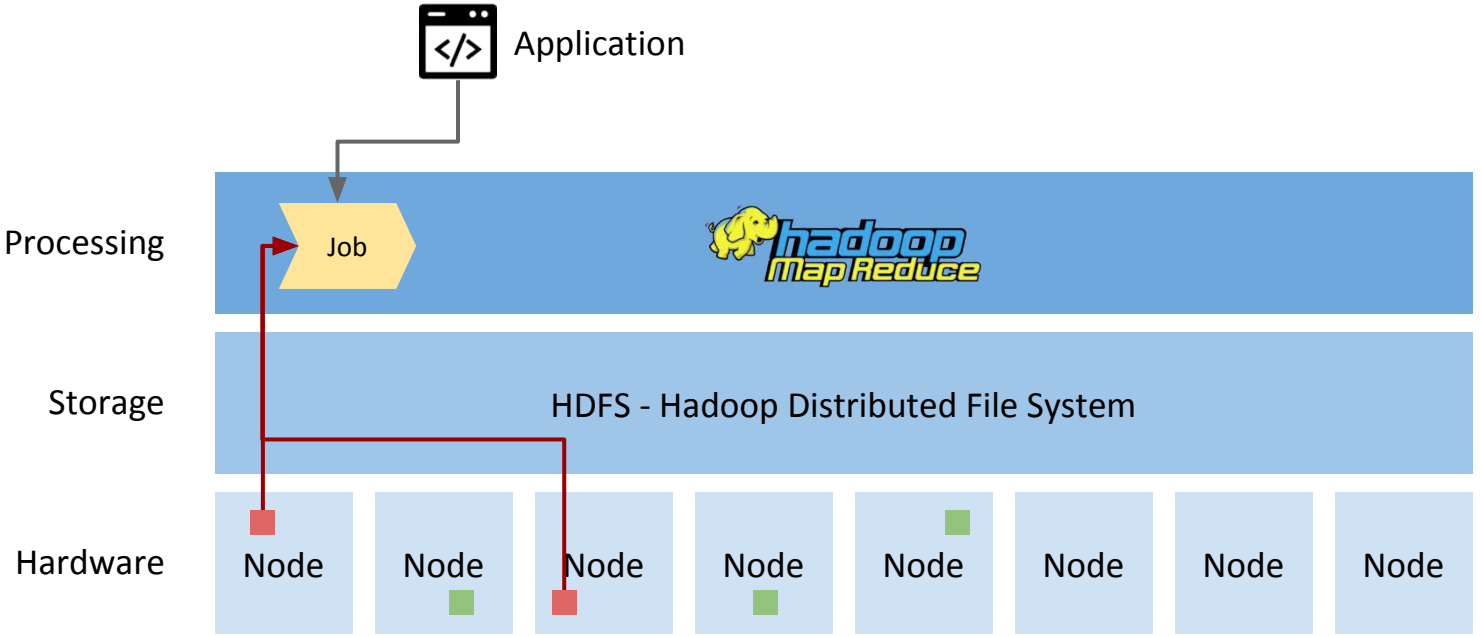
MapReduce


Processing
hadoop
MapReduce
Storage
HDFS - Hadoop Distributed File System
Hardware
Node
Node
Node
Node
Node
Node
Node
Node

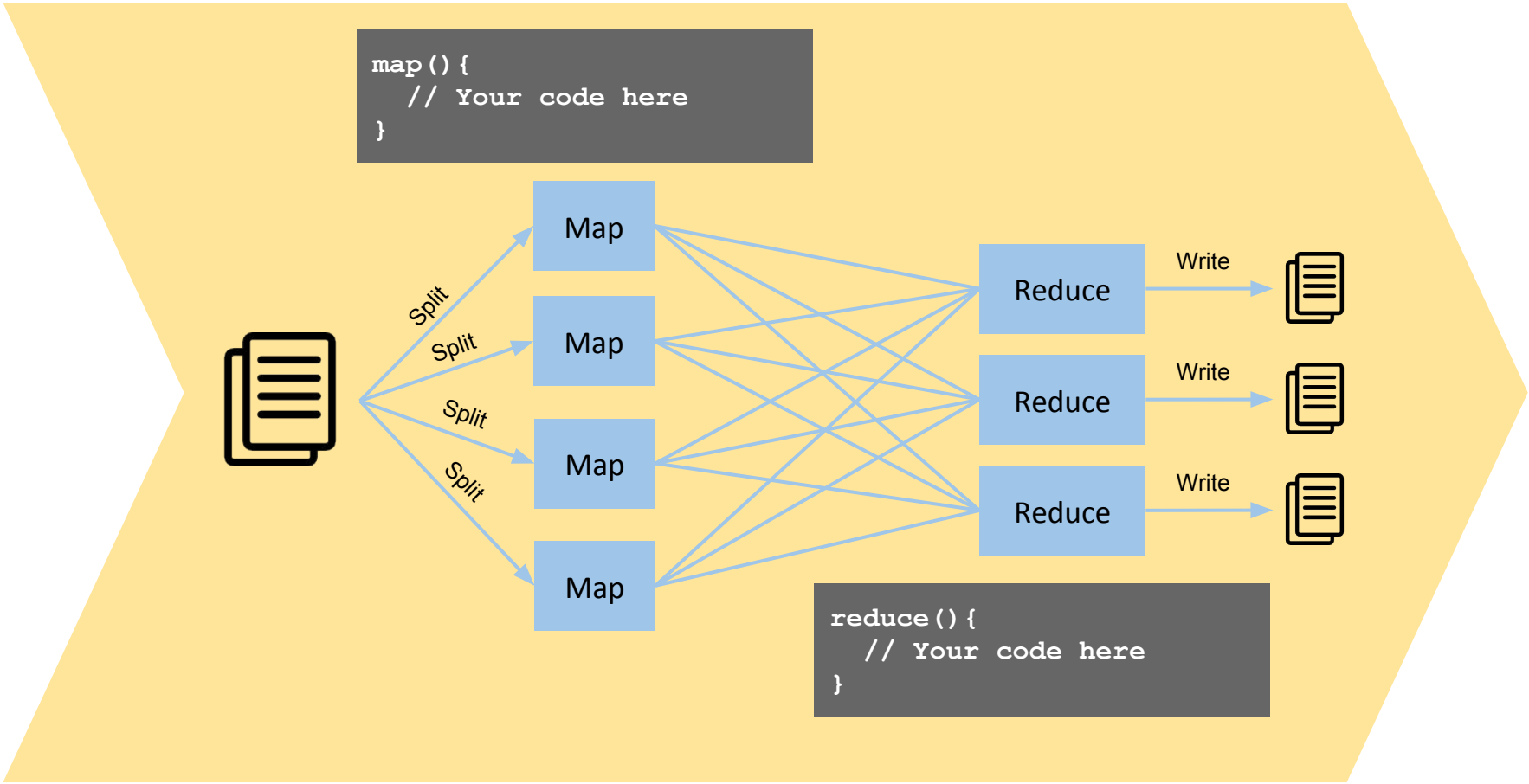
Data Pipeline



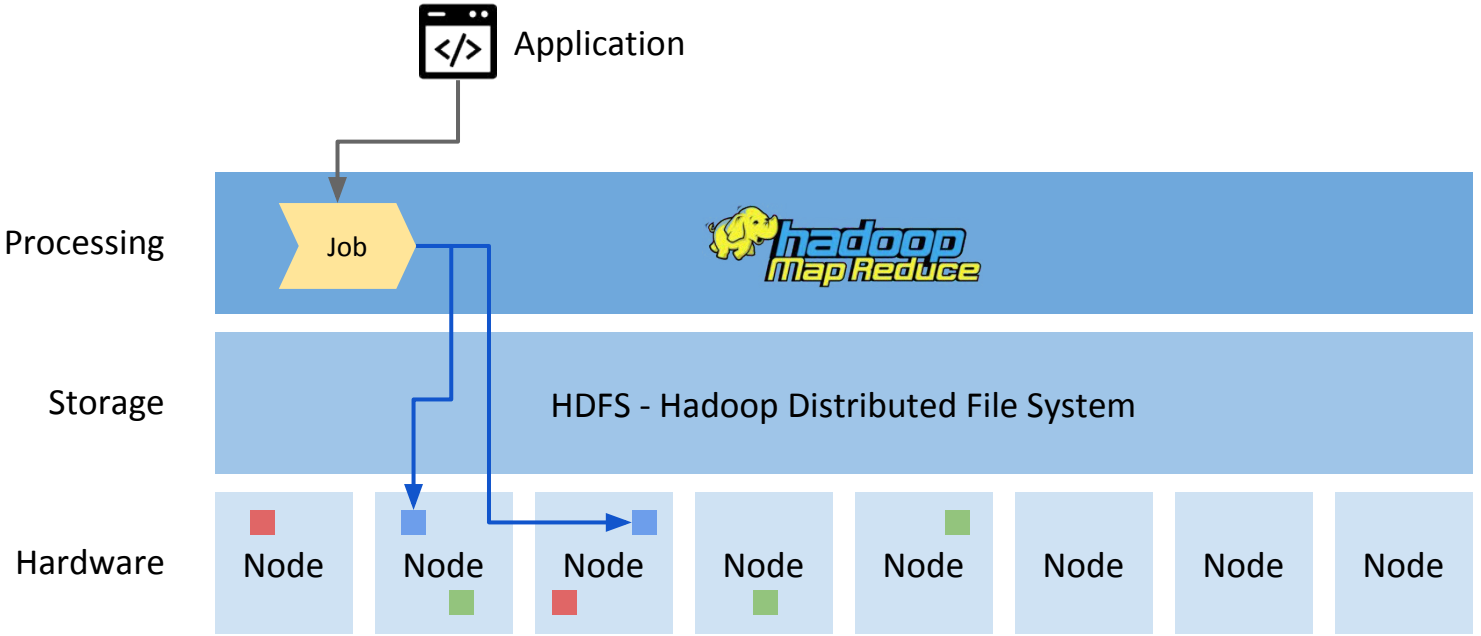
Data Pipeline



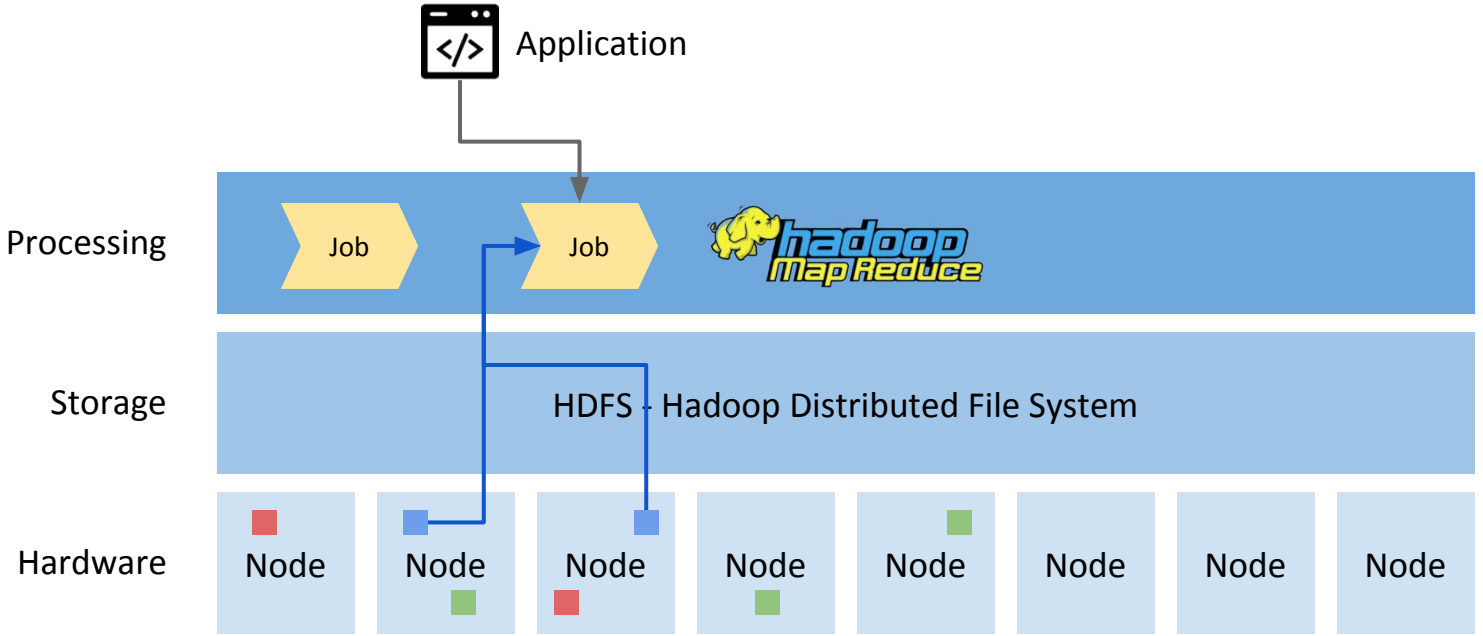
MapReduce Job



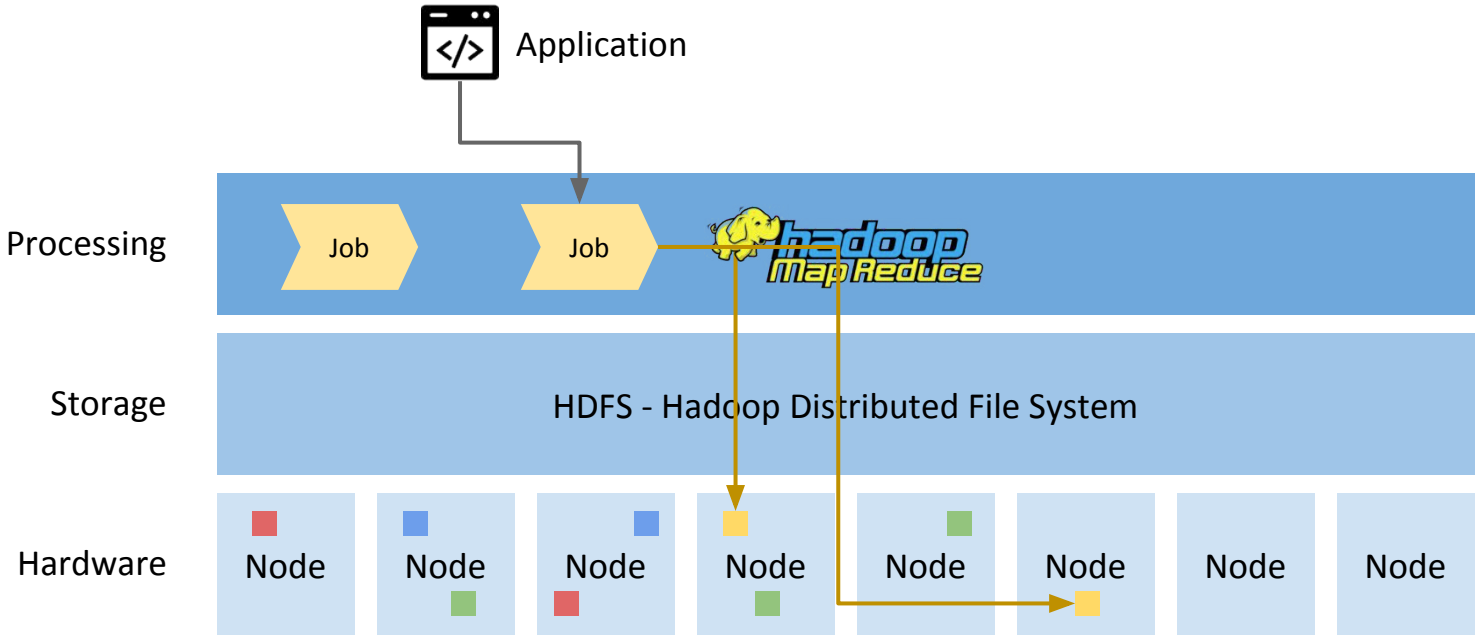
Data Pipeline



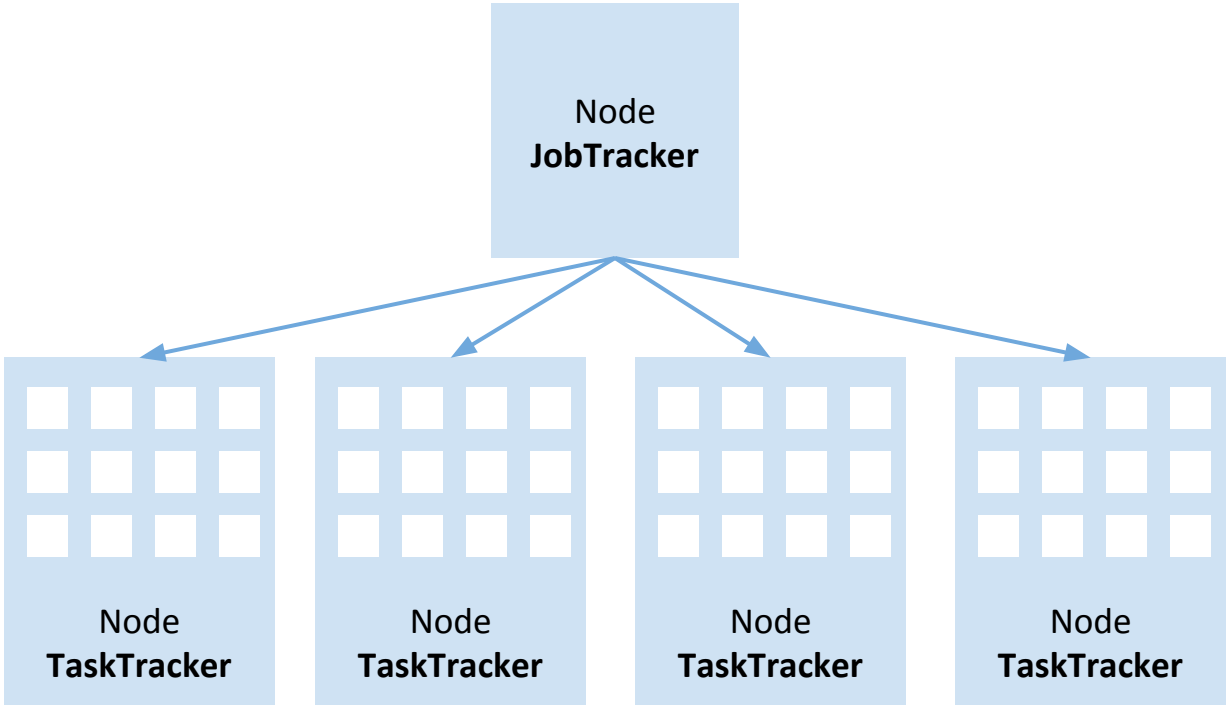
Data Pipeline



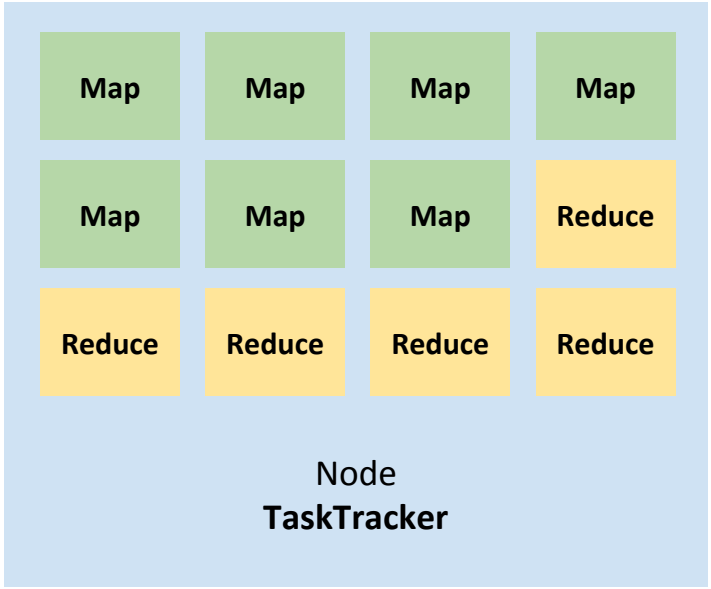
Data Pipeline



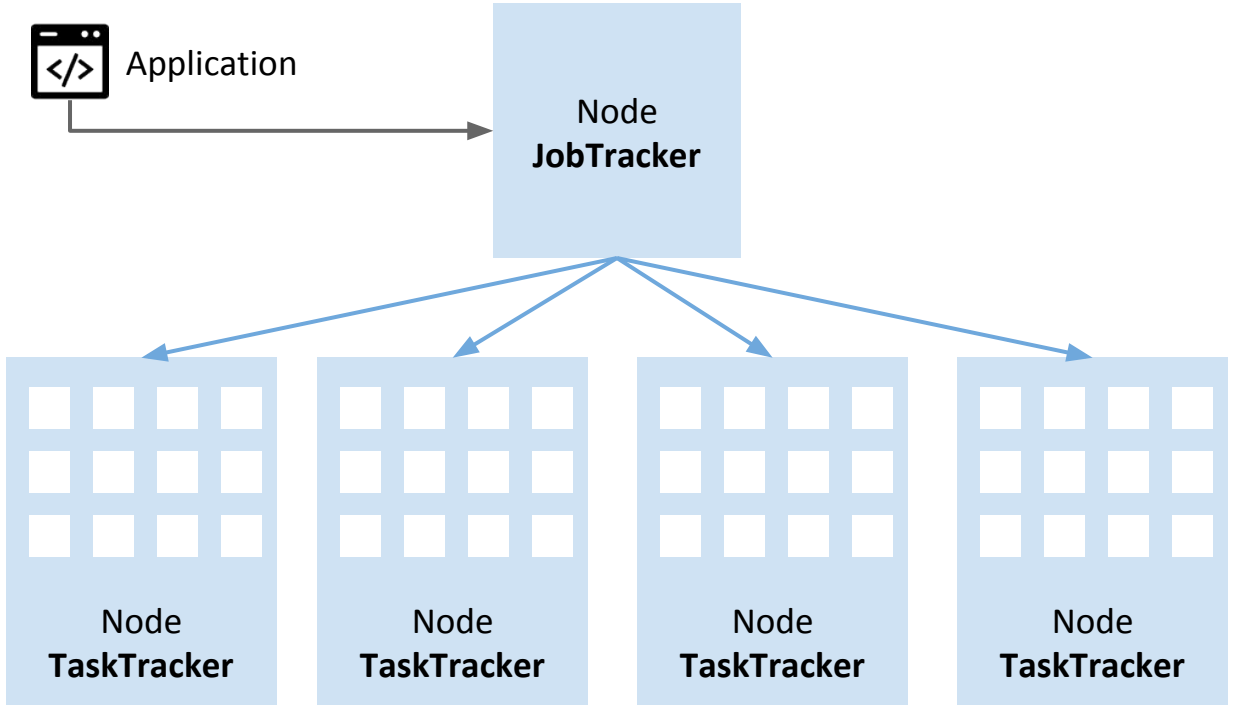
MapReduce 1.0 Architecture



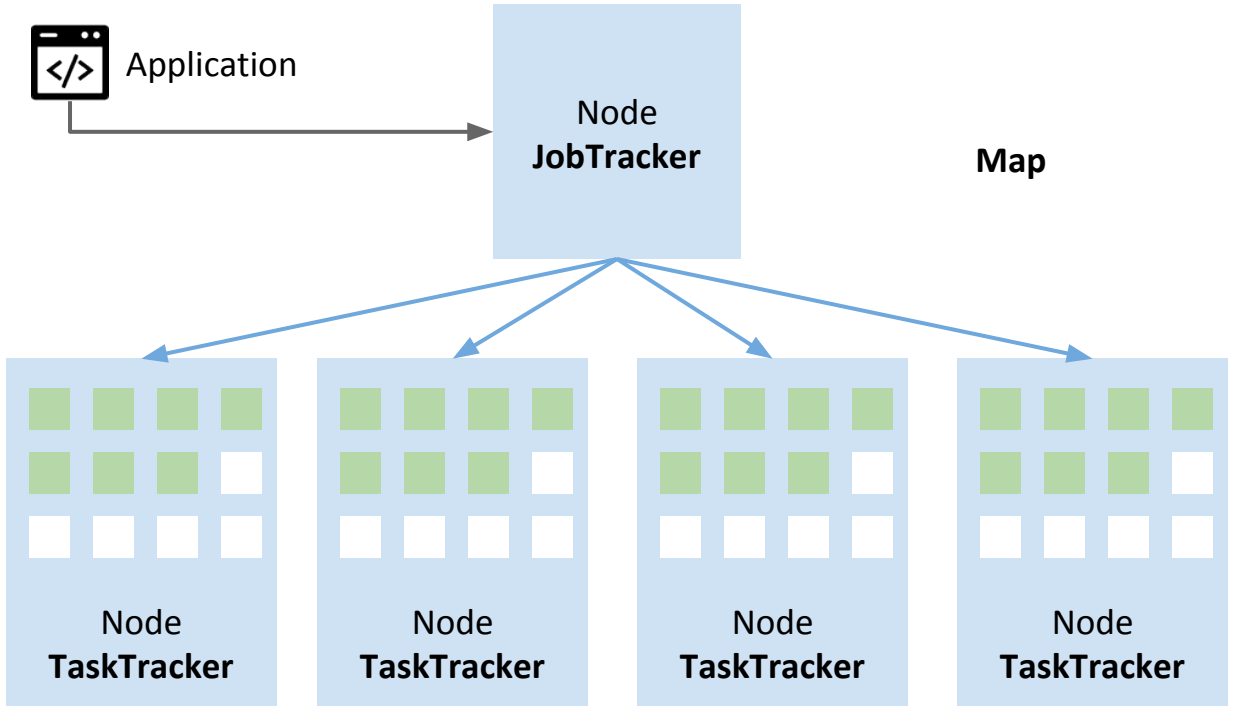
MapReduce 1.0 Architecture



MapReduce 1.0 Architecture



MapReduce 1.0 Architecture



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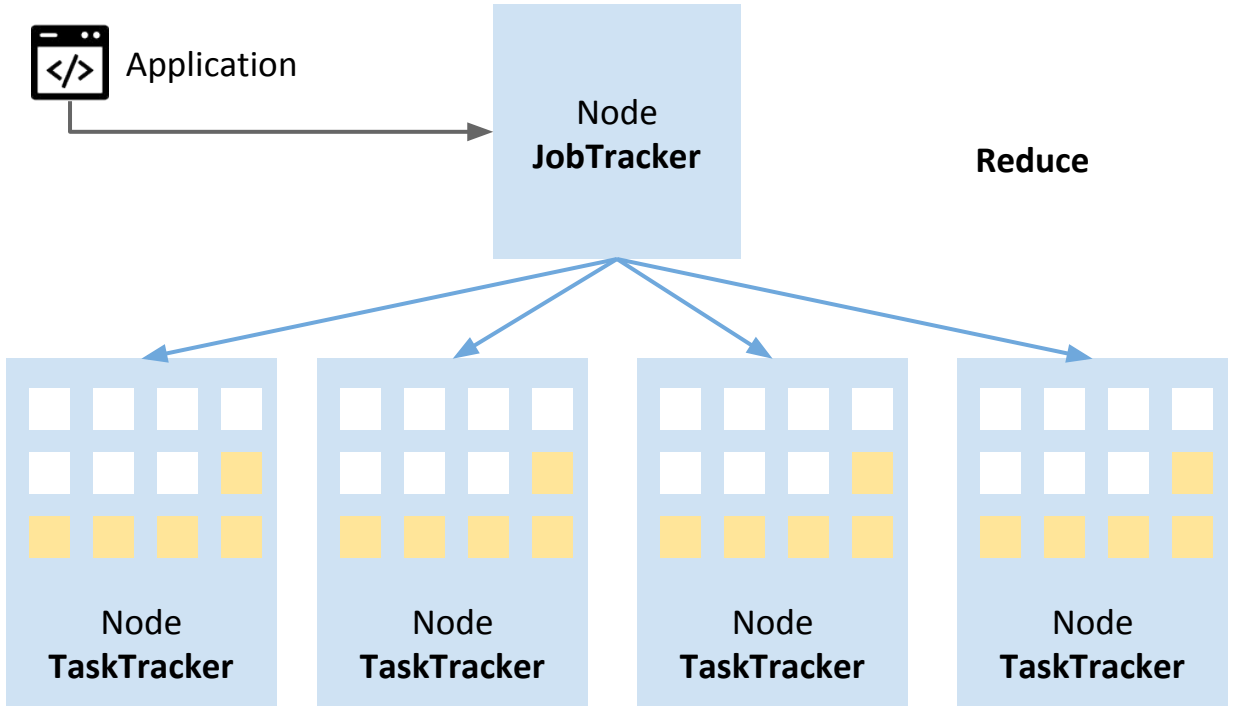
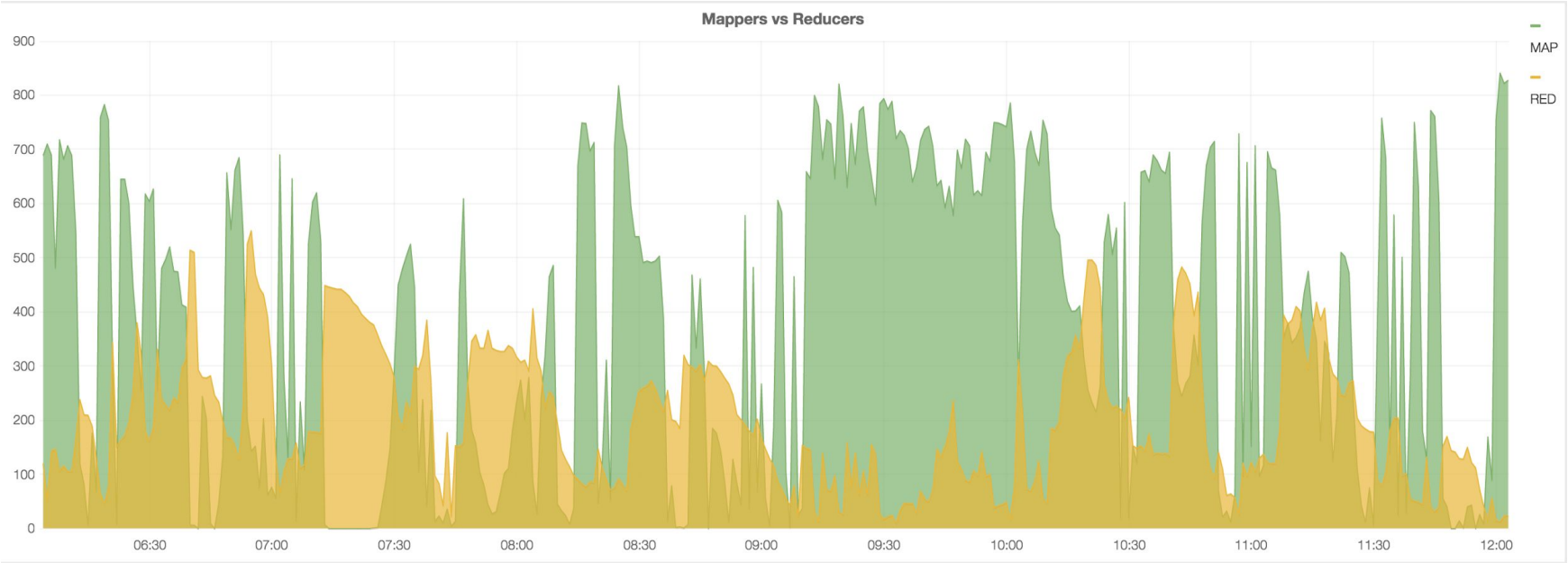
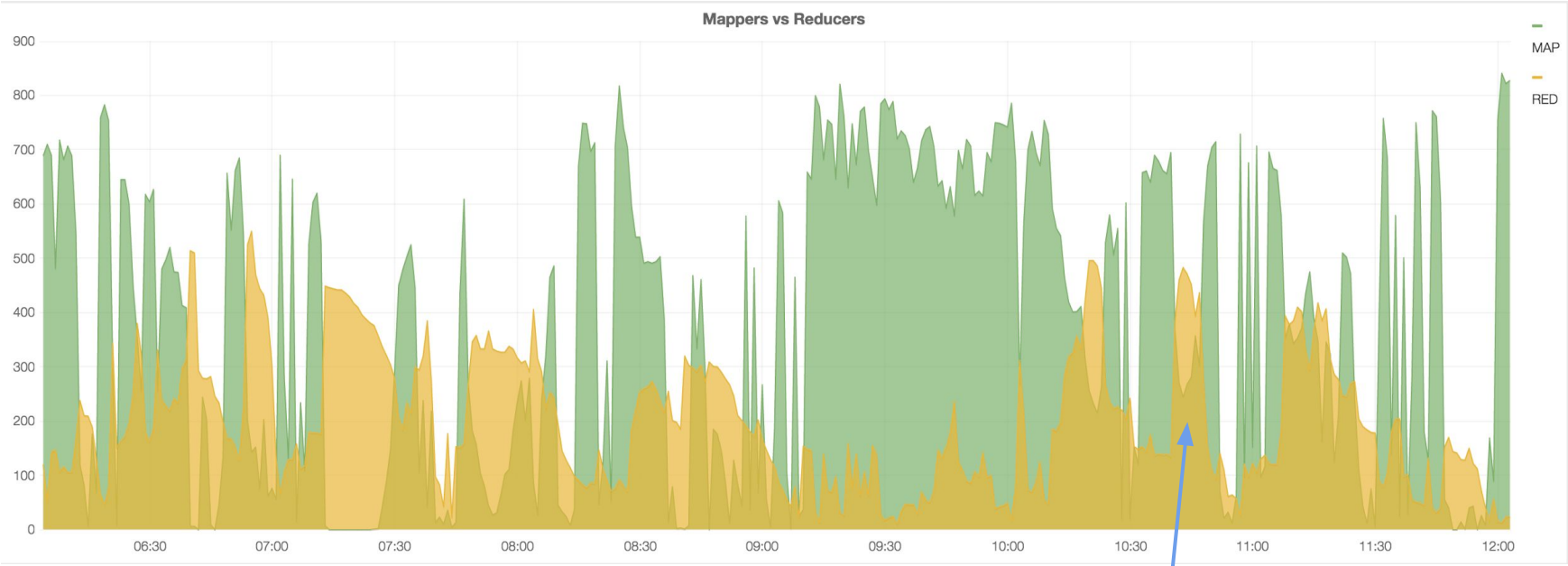


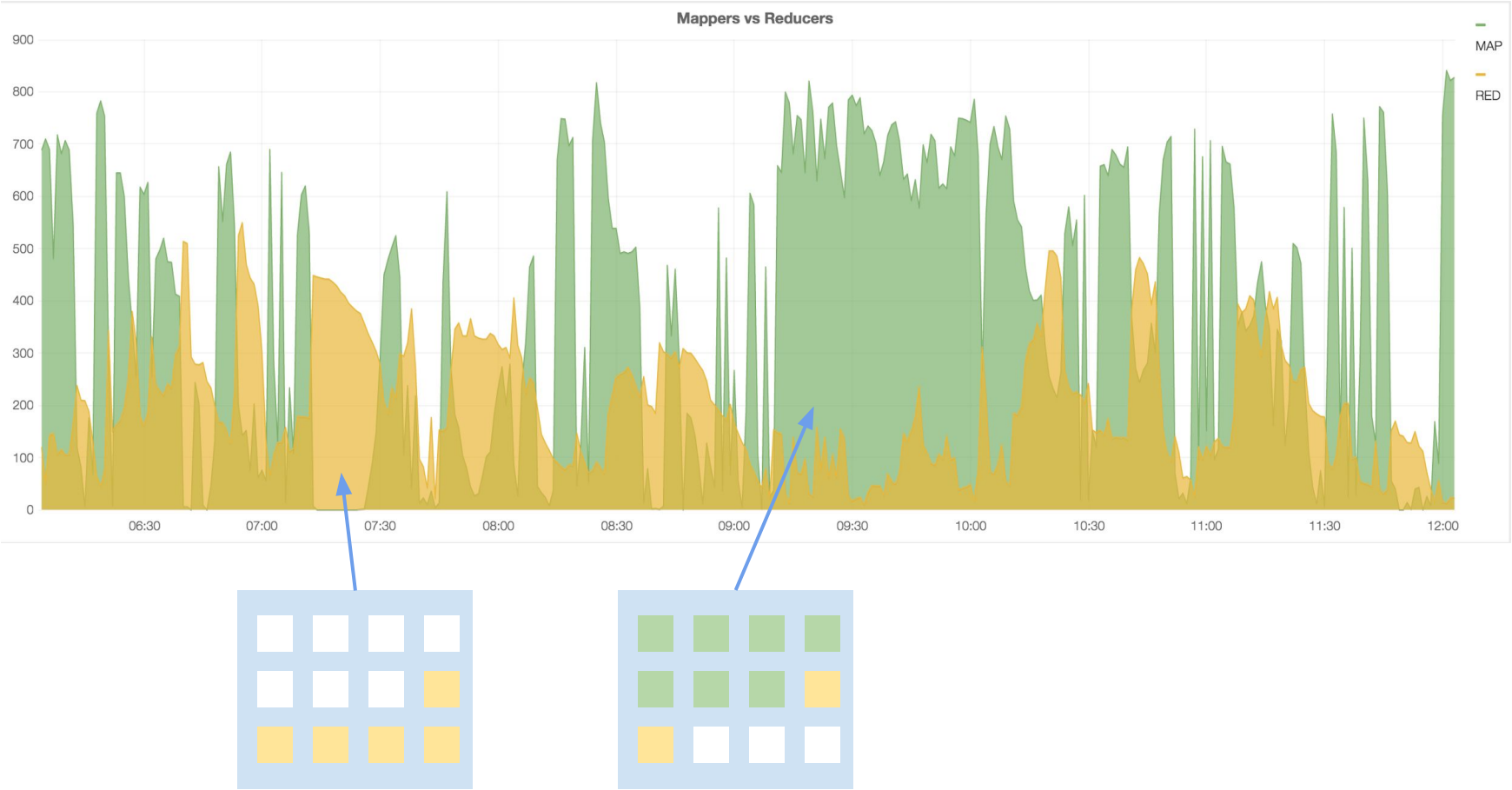
Limitations



Limitations

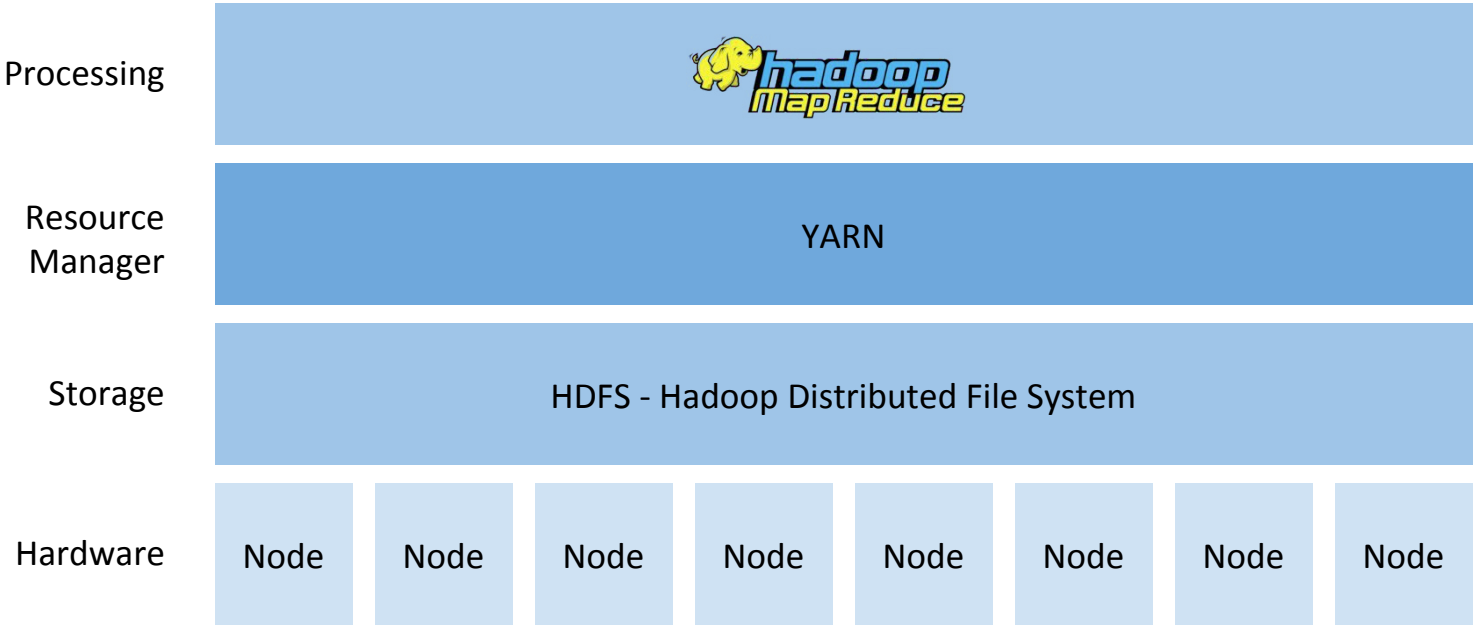


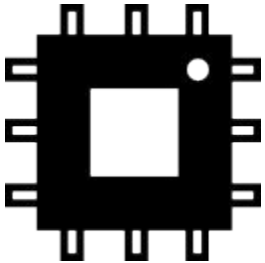
Limitations



YARN

YARN - Yet Another Resource Negotiator

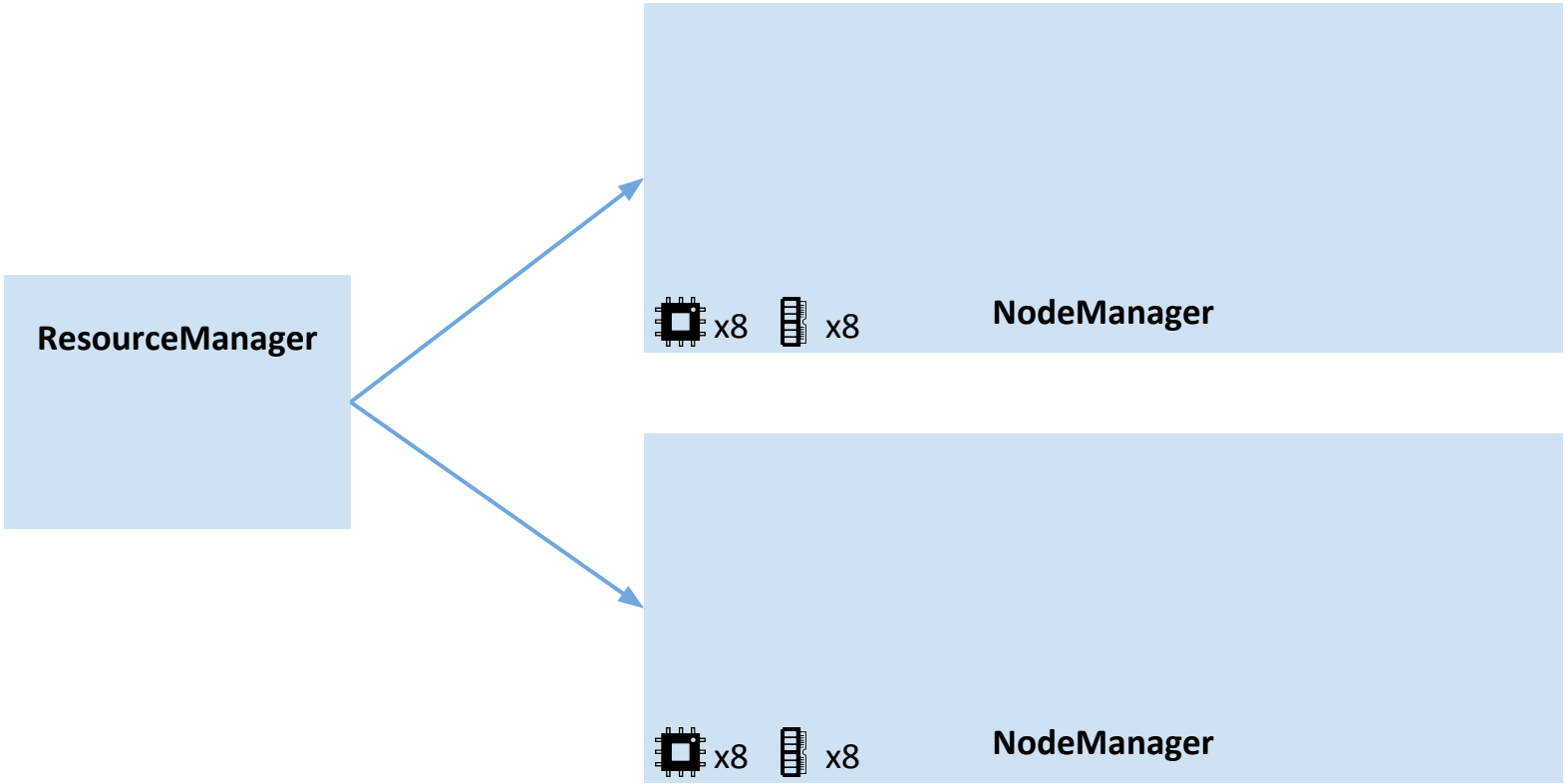




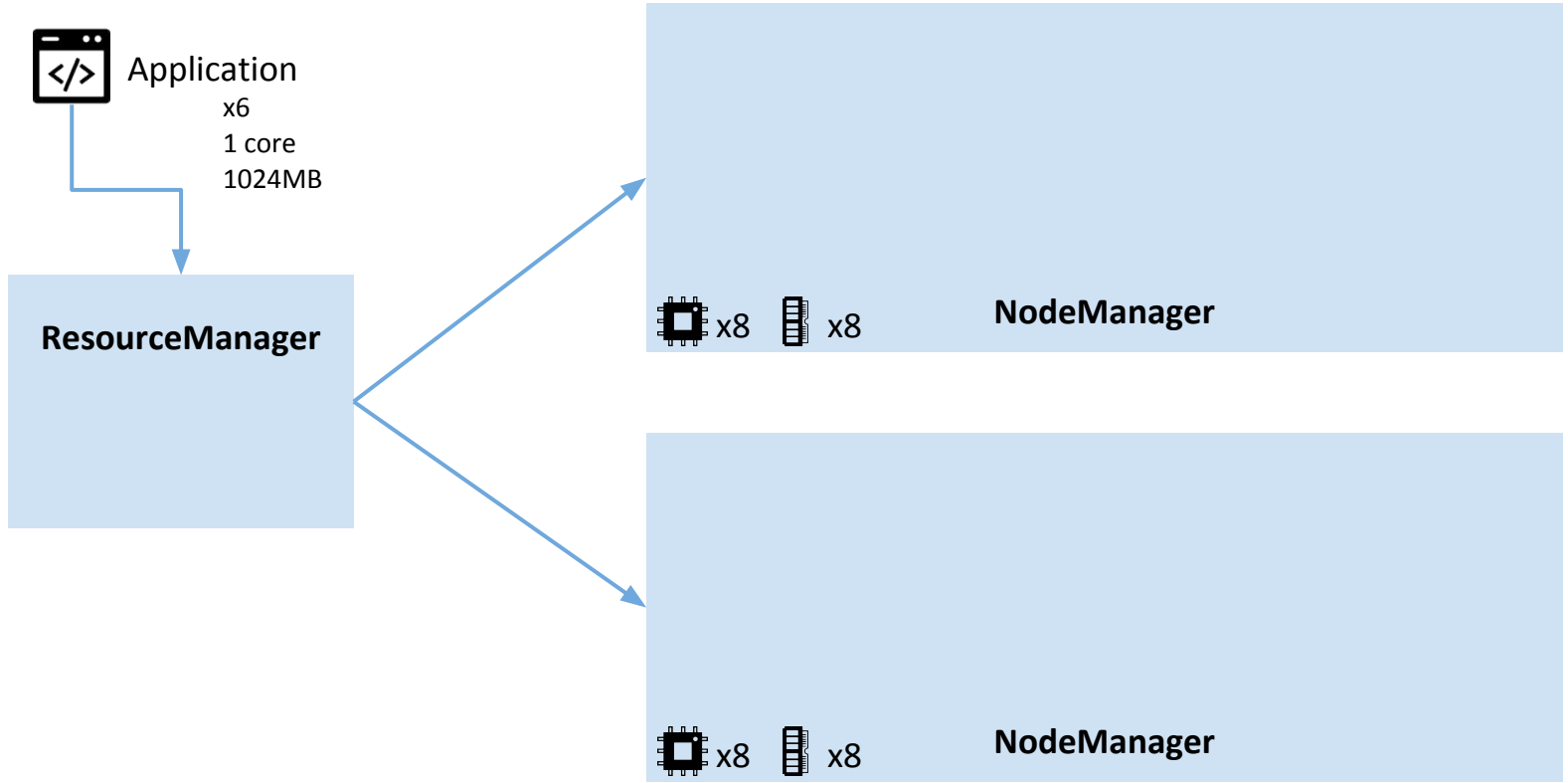
Cores

Memory

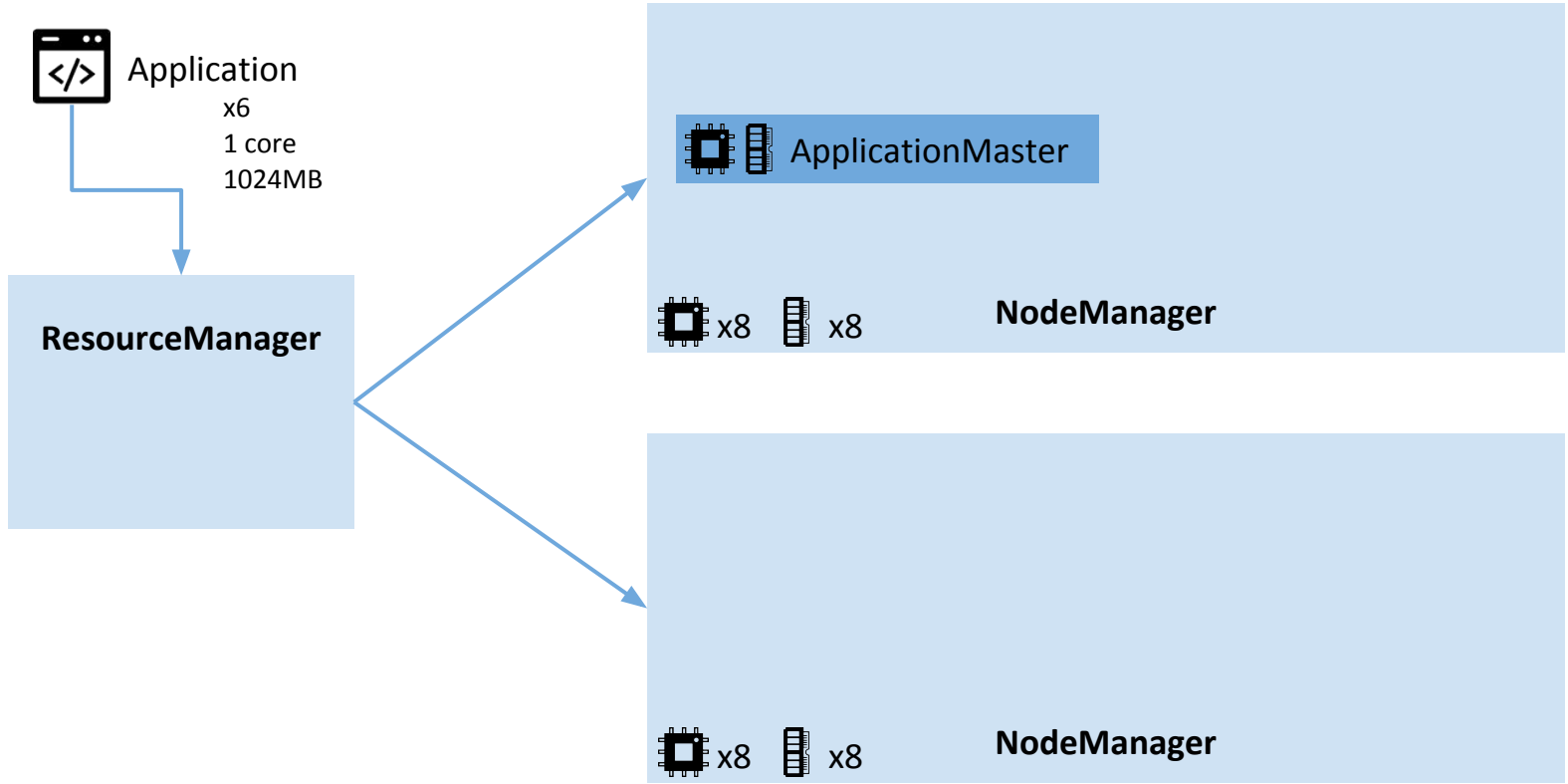
YARN Architecture



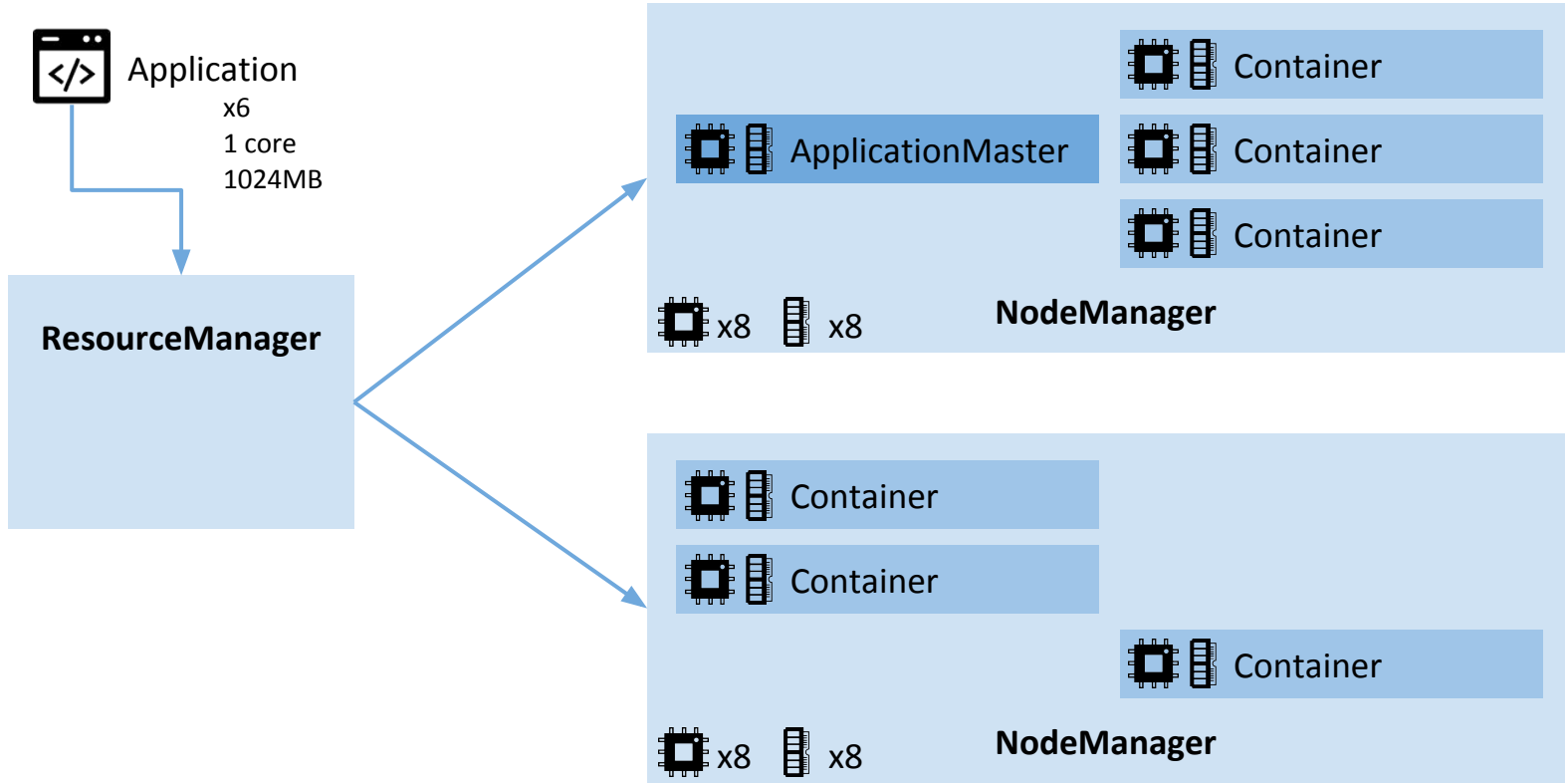
YARN Architecture



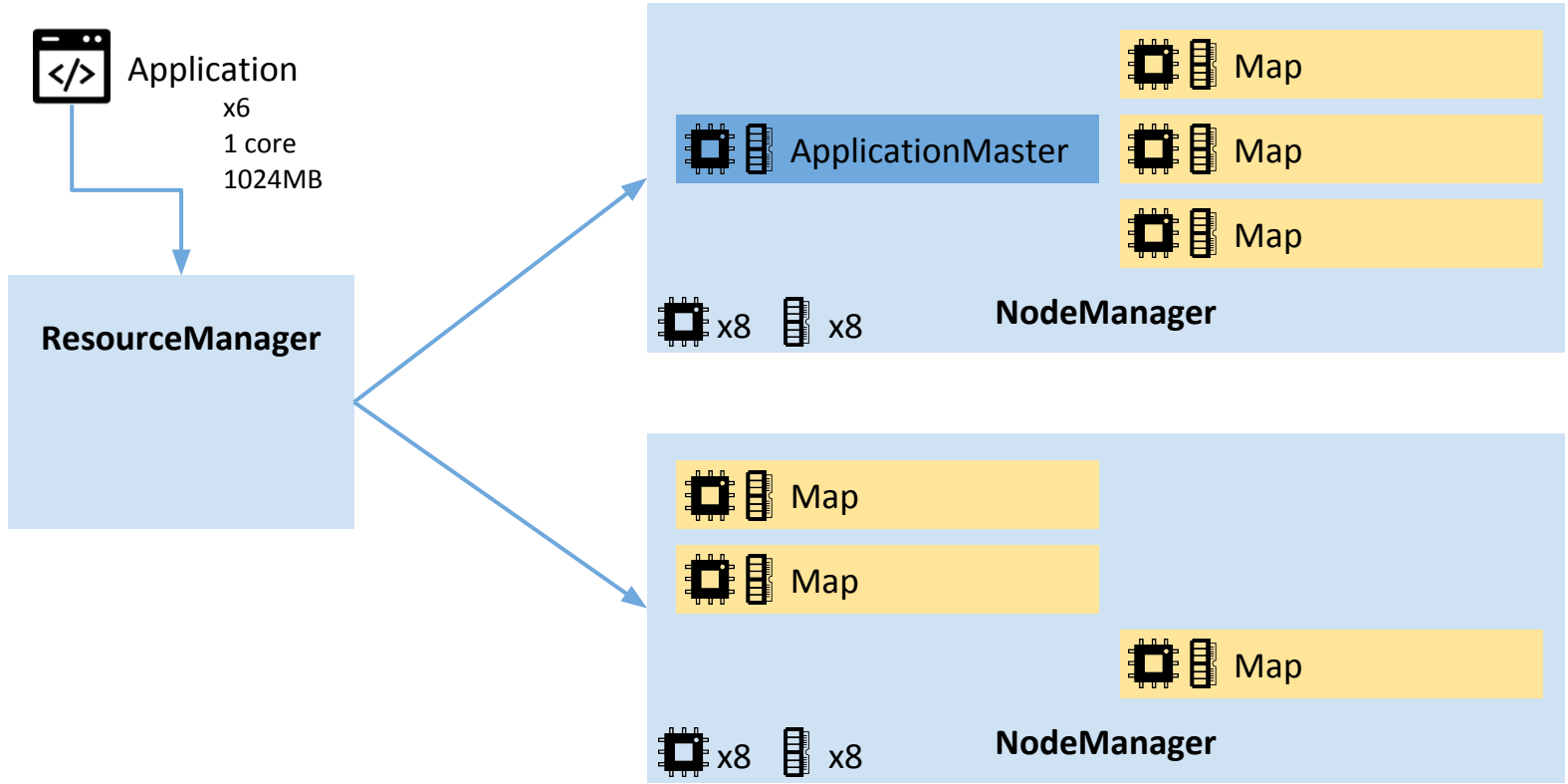
YARN Architecture



YARN Architecture



YARN Architecture



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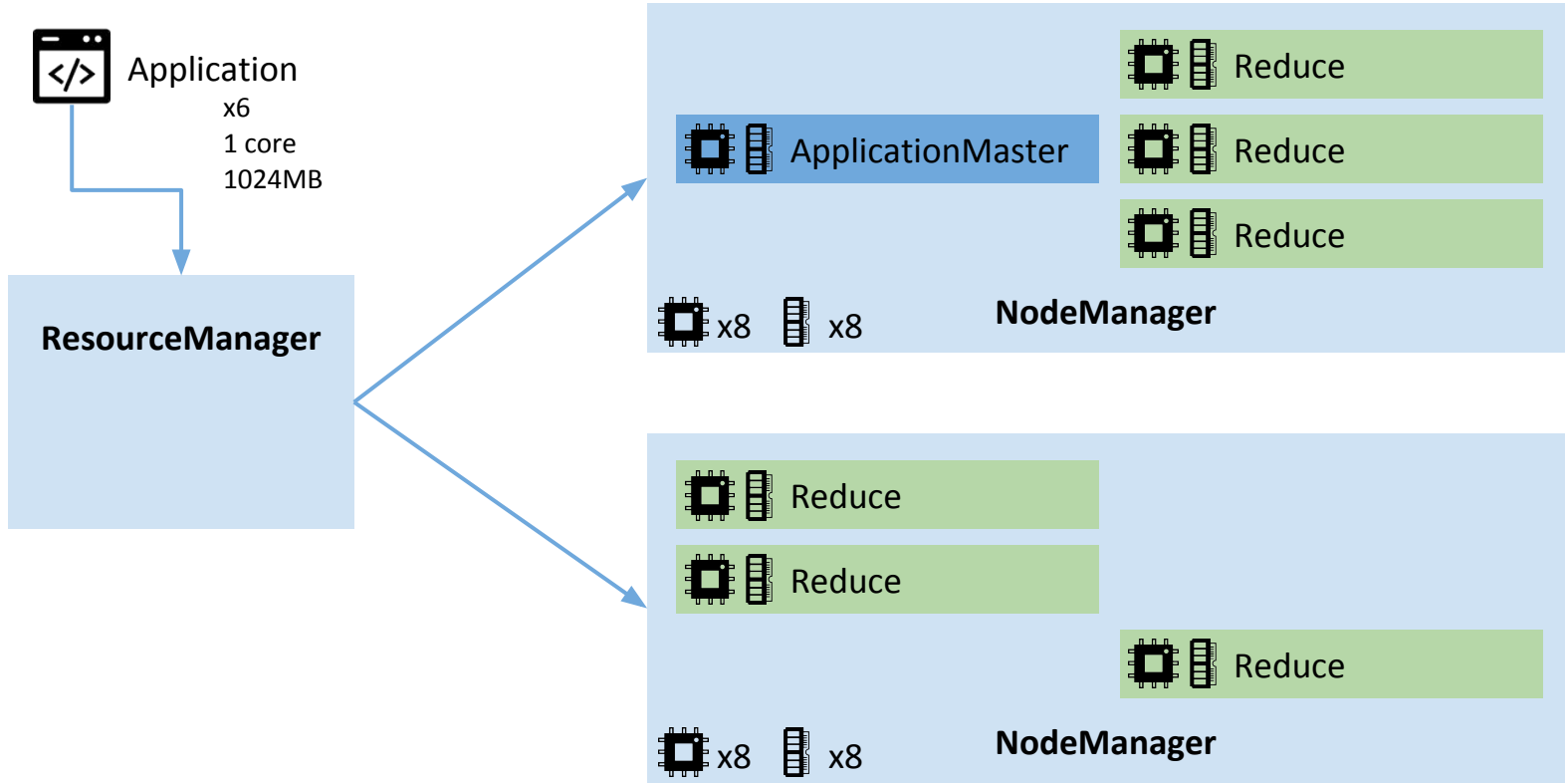
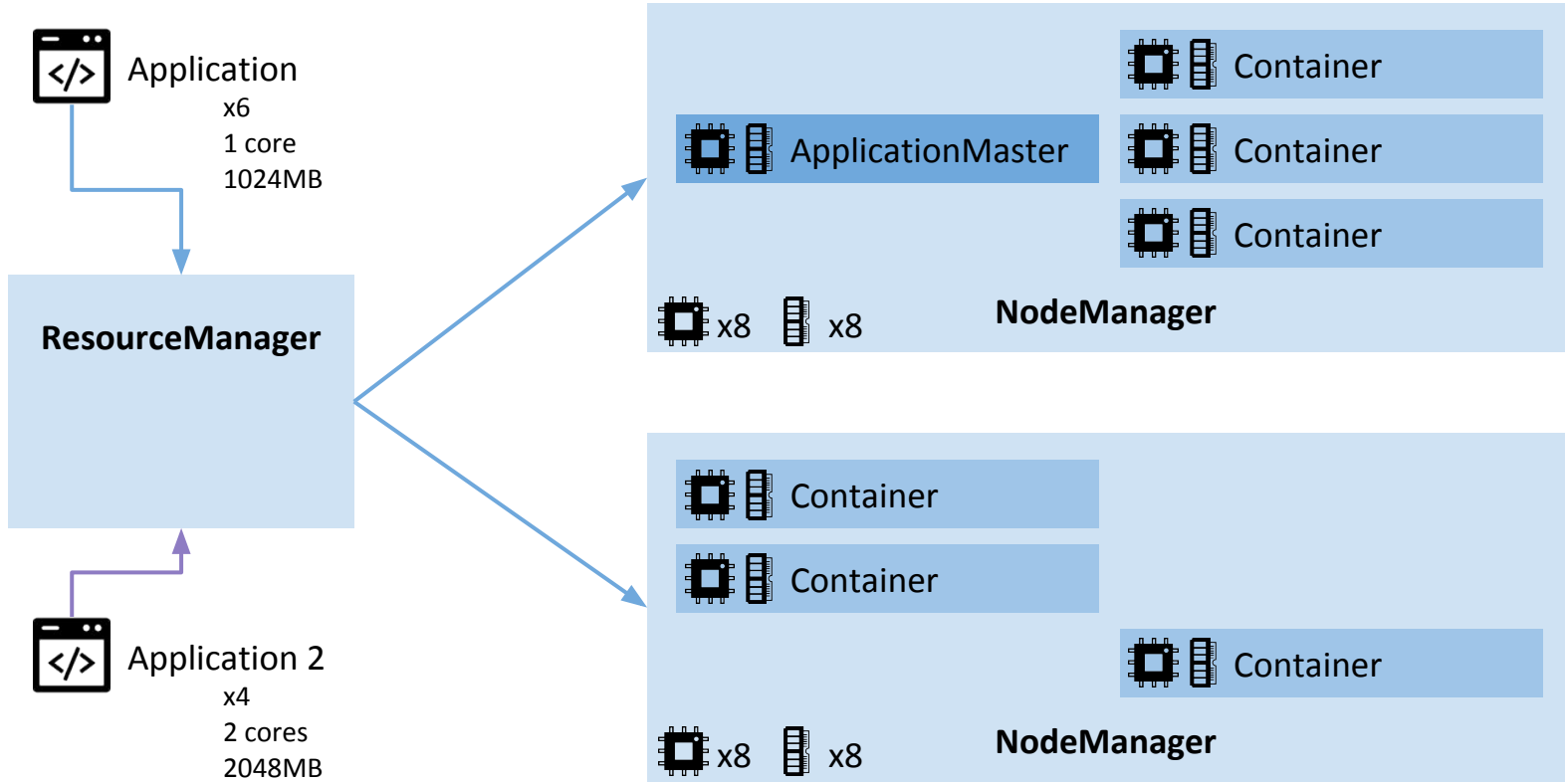
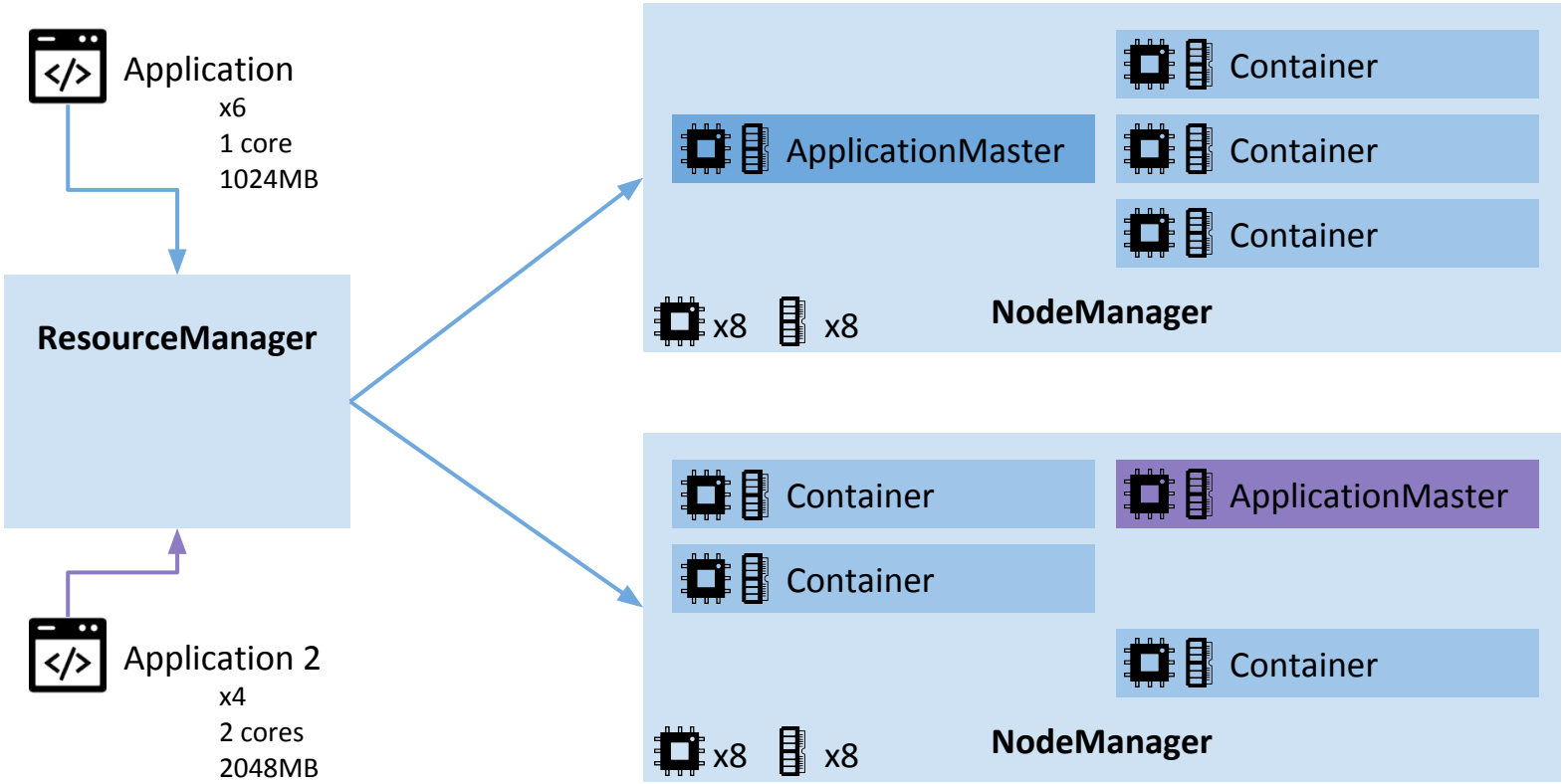


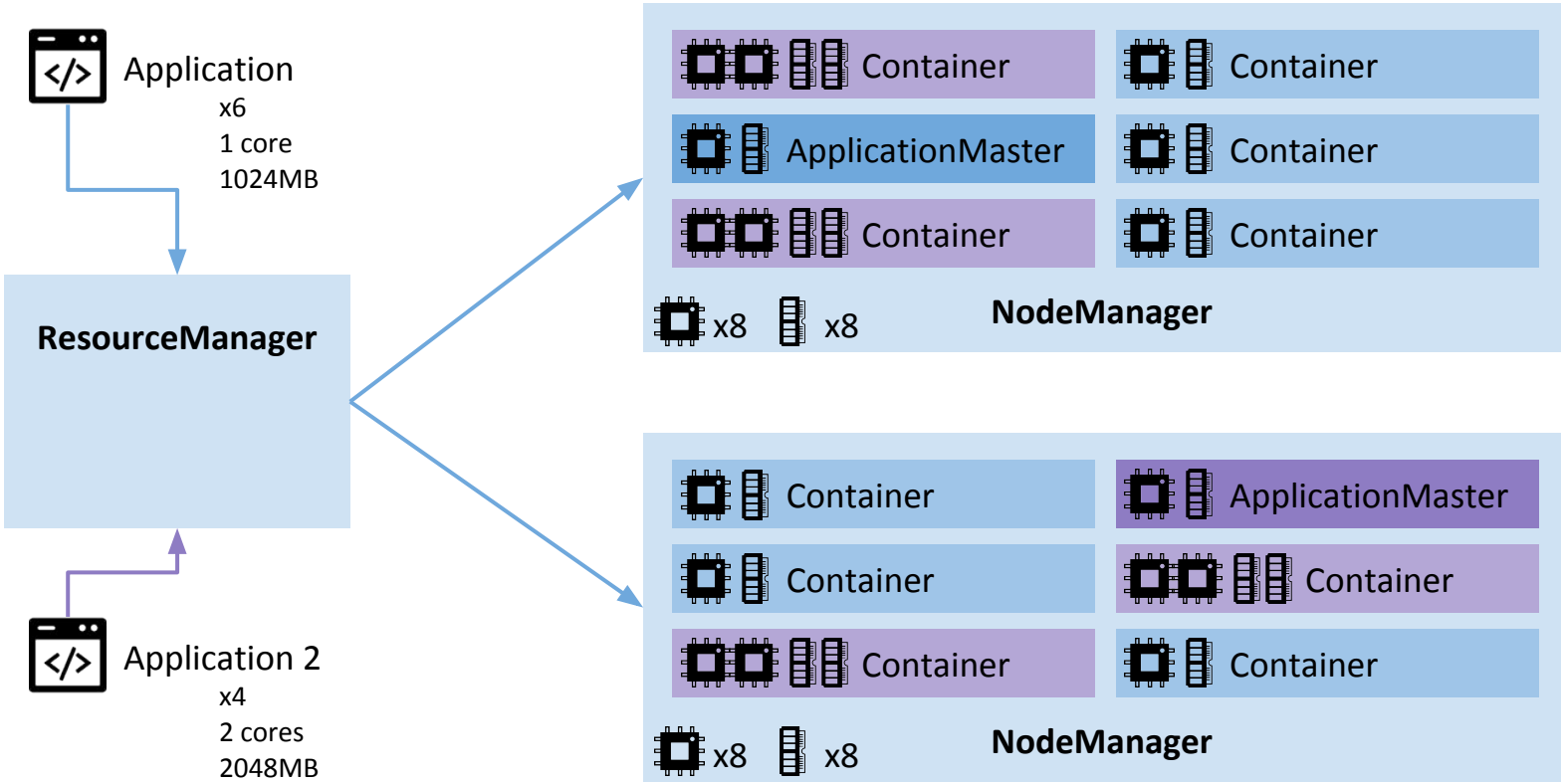
YARN Architecture



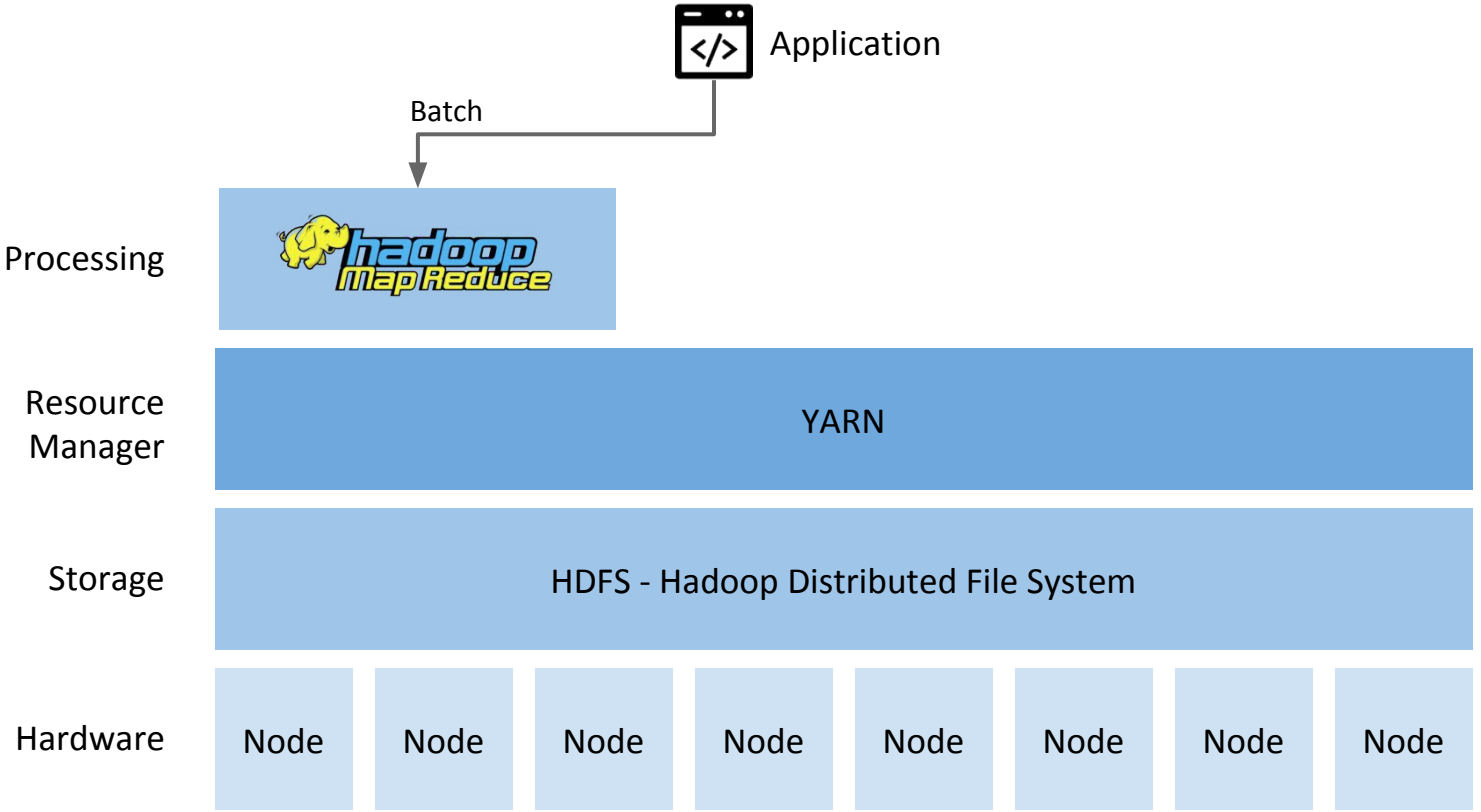
YARN Architecture



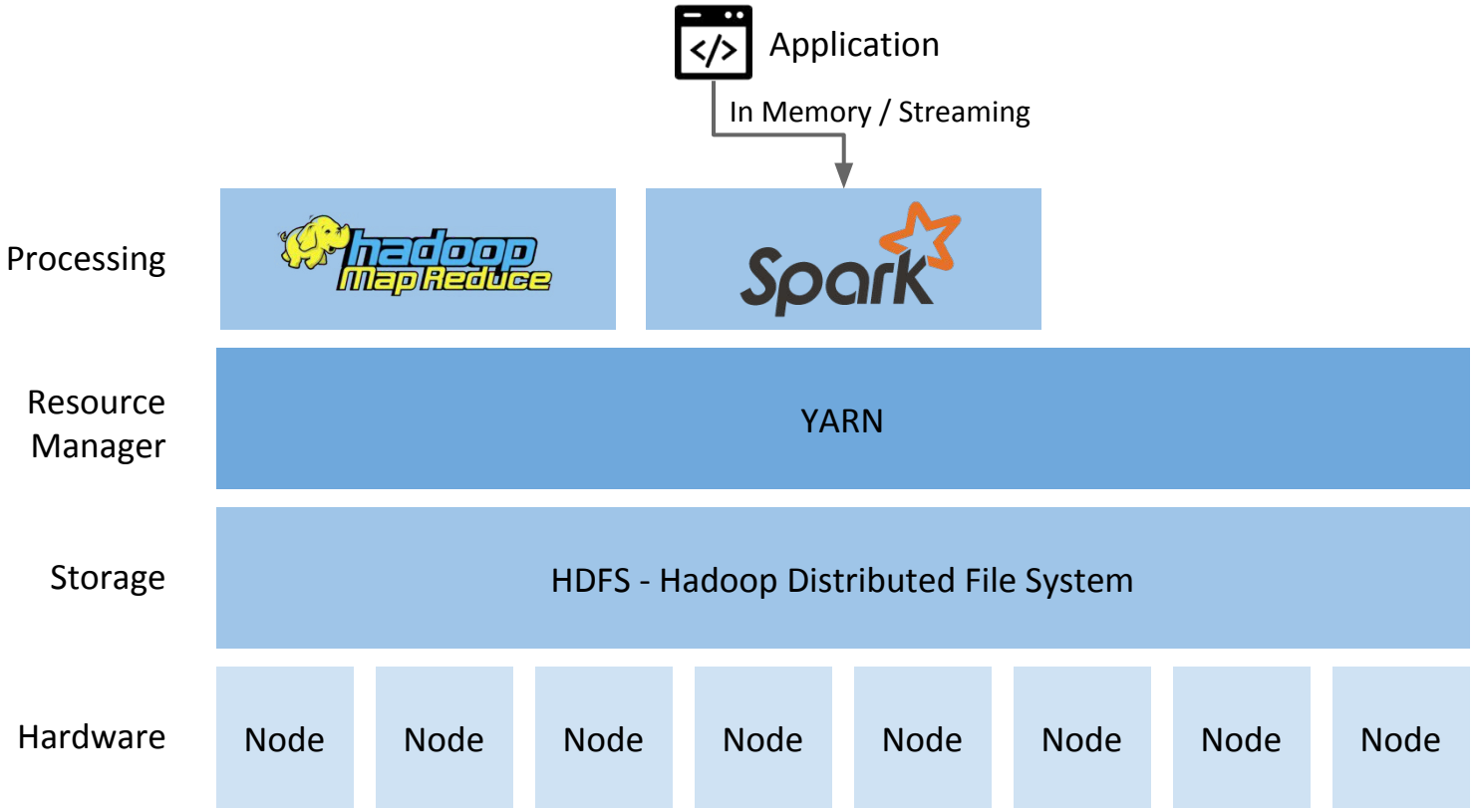
YARN Architecture



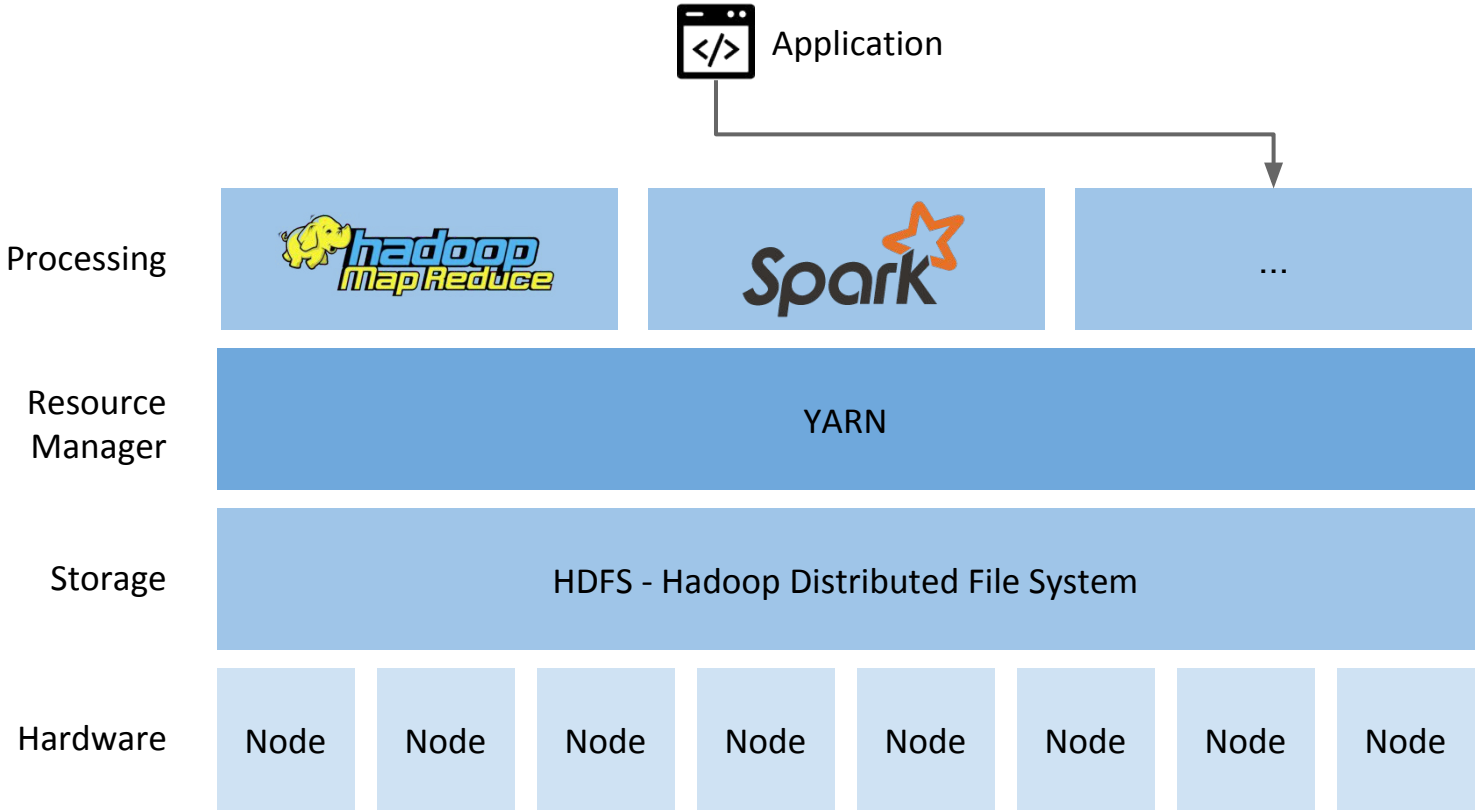
New Paradigms



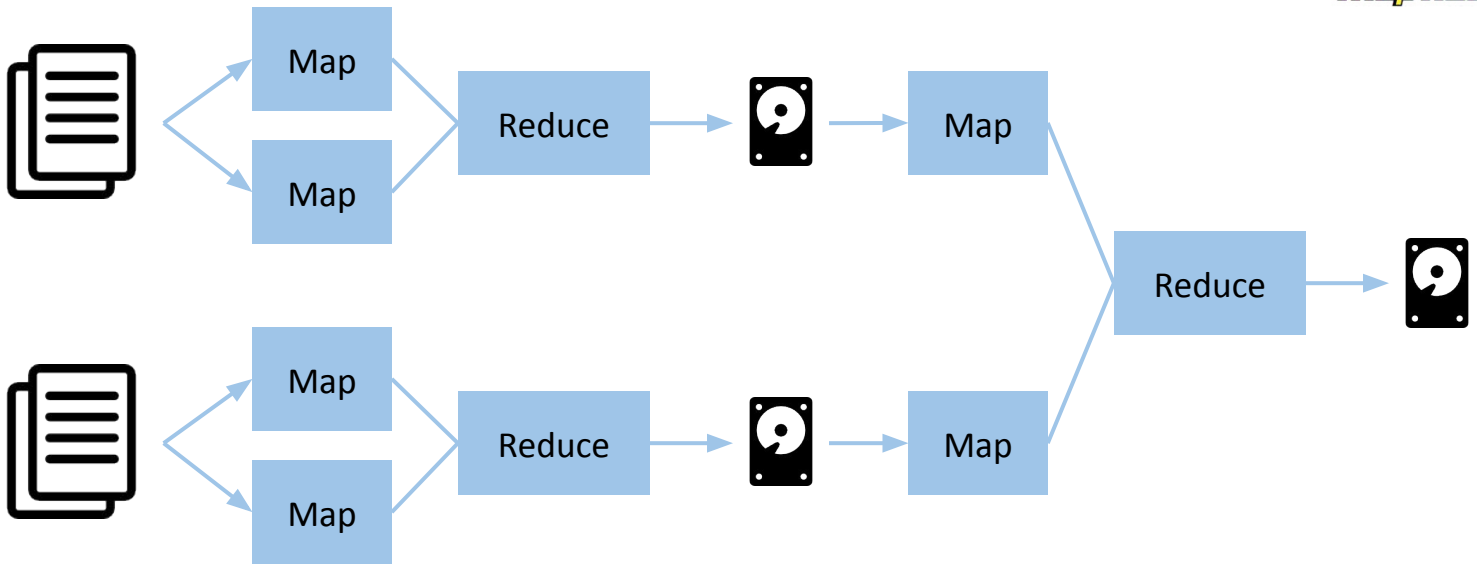
New Paradigms



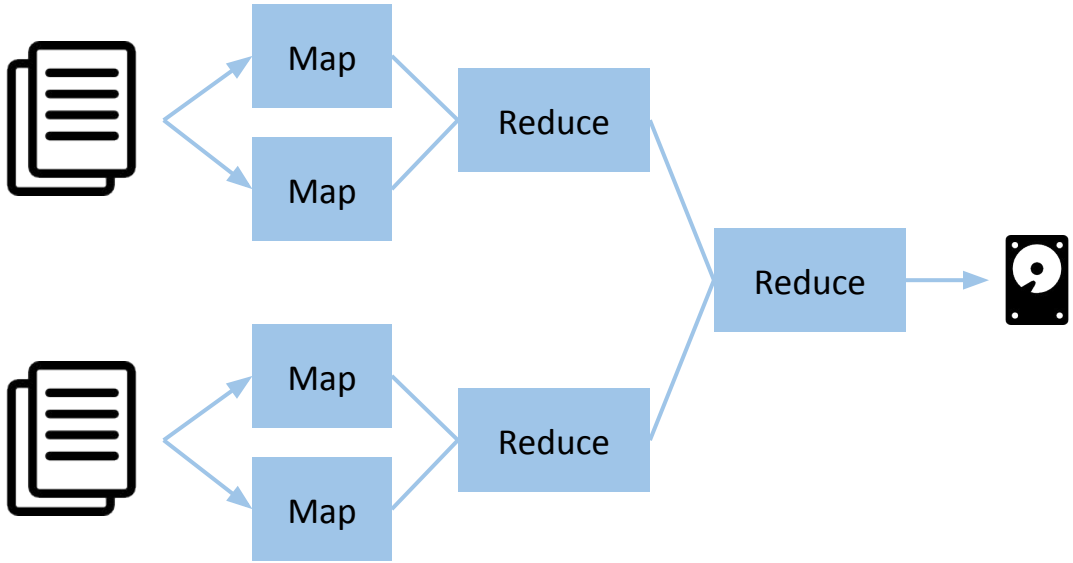
New Paradigms



Improved Data Pipelines



Improved Data Pipelines



Demo

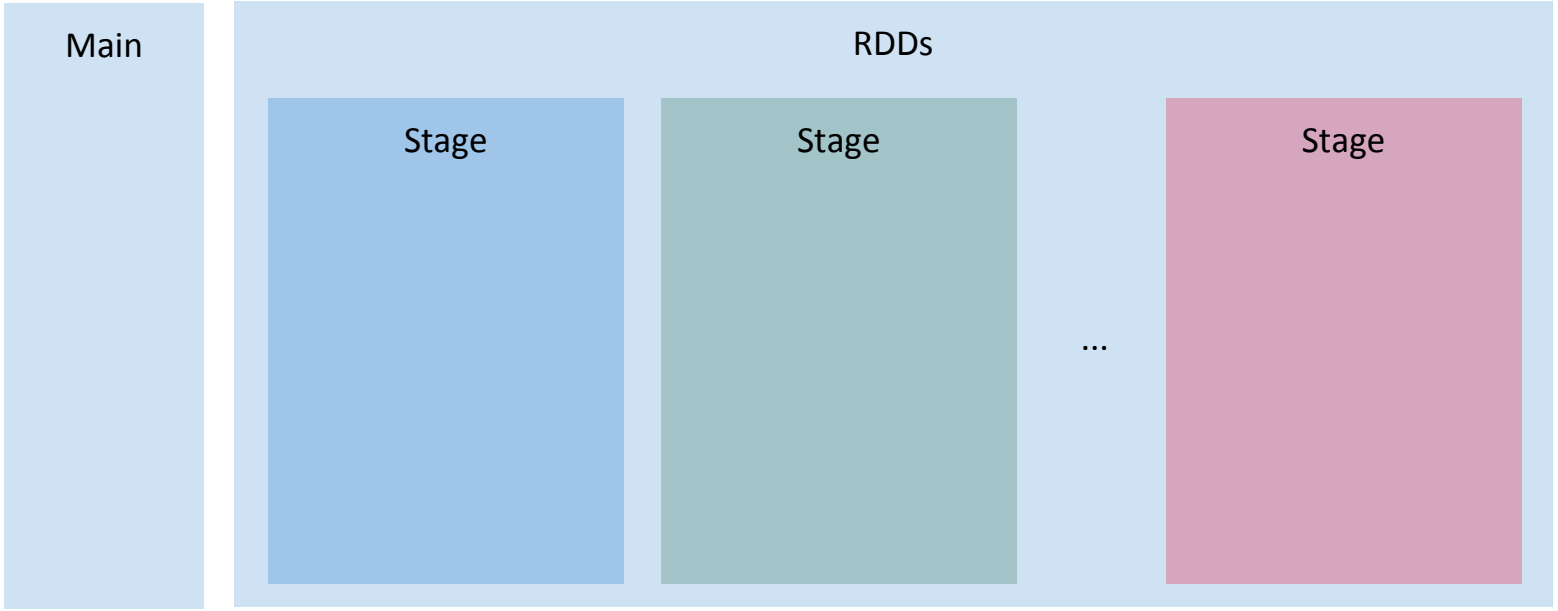

Spark

Spark Job

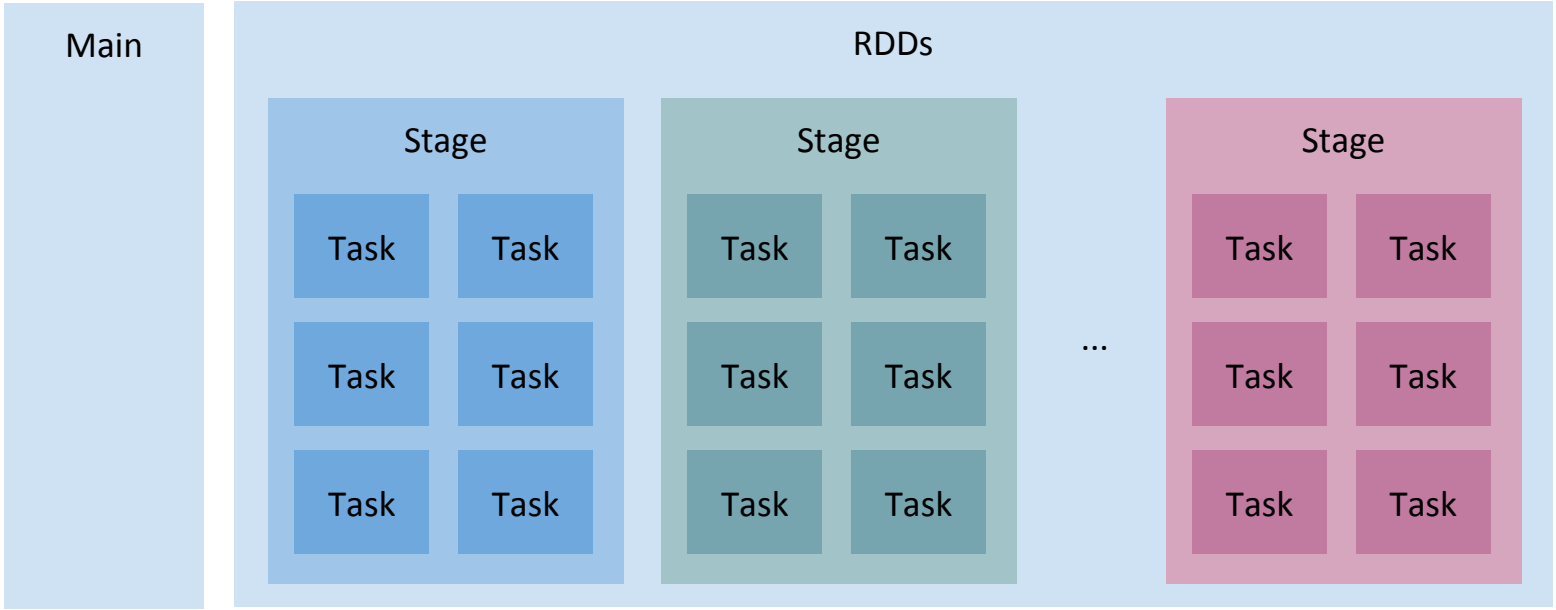
```
def main(args: Array[String]): Unit =
{
 val sparkConf = new SparkConf()
 val sc = new SparkContext(sparkConf)

 sc.rdd(...).action()

 sc.stop()
}
```

Spark Job

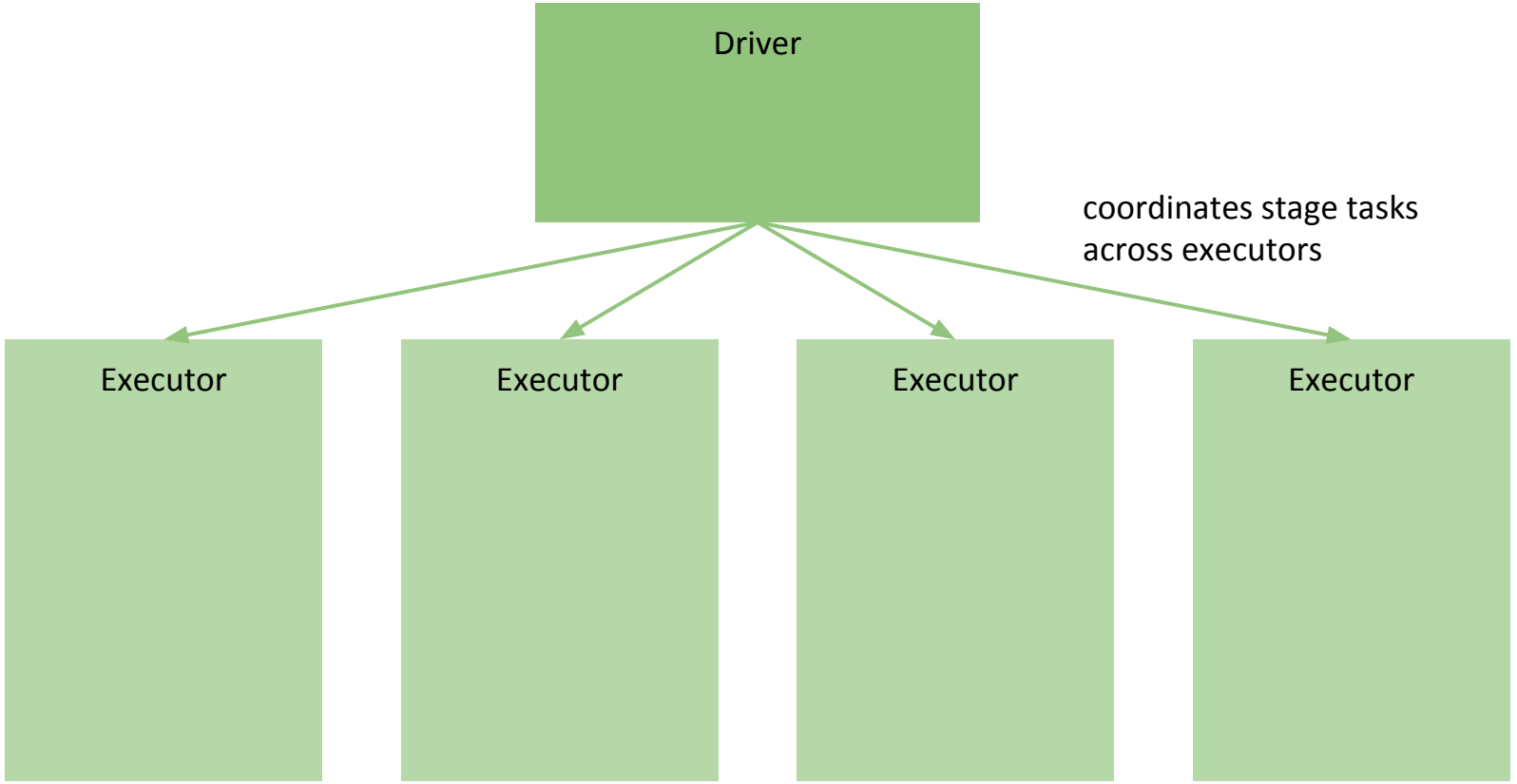
Spark Job



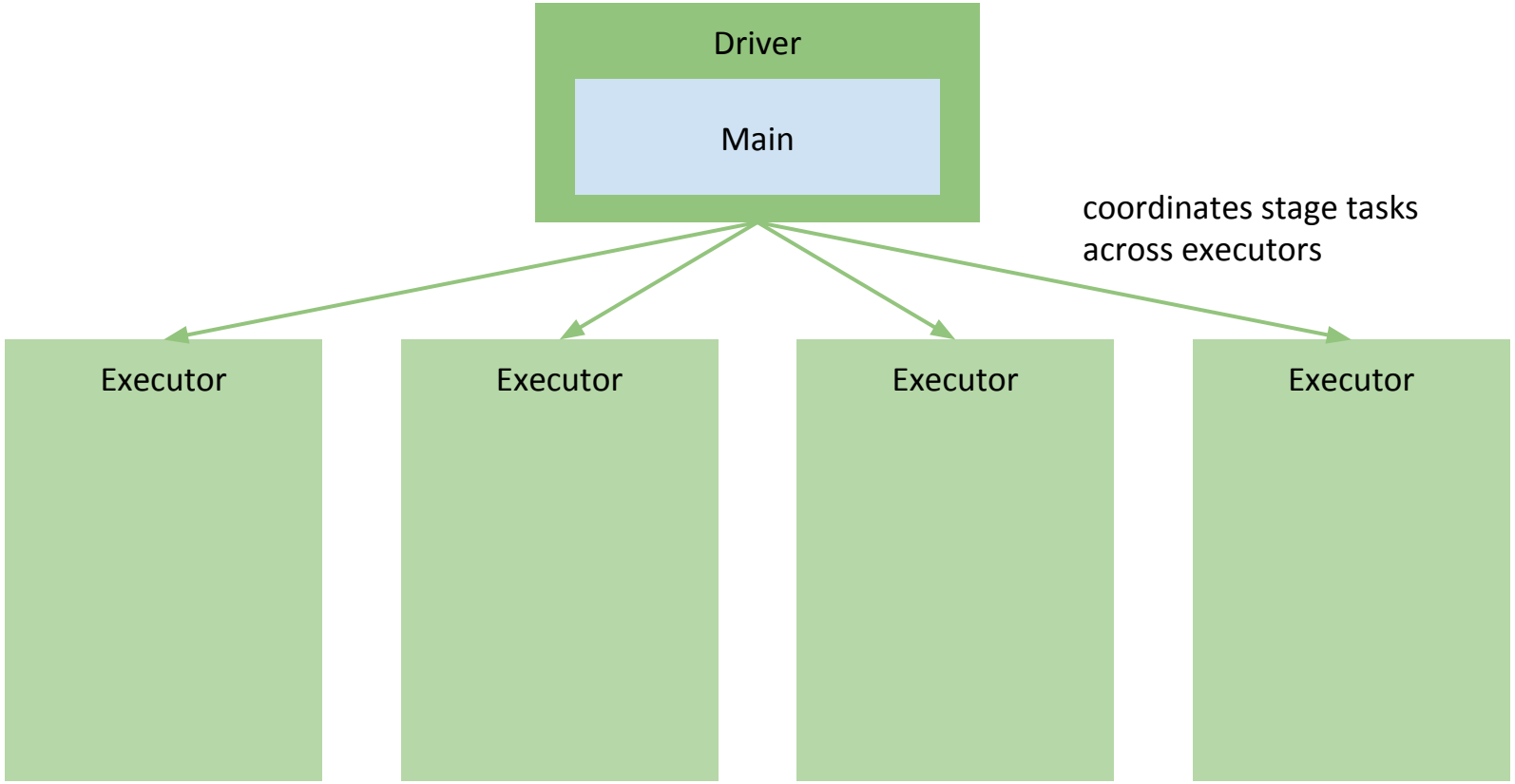
Spark Job


Main
RDDs
Stage
Task
Task
Task
Task
Task
Task
Stage
Task
Task
Task
Task
Task
Task
...
Stage
Task
Task
Task
Task
Task
Task

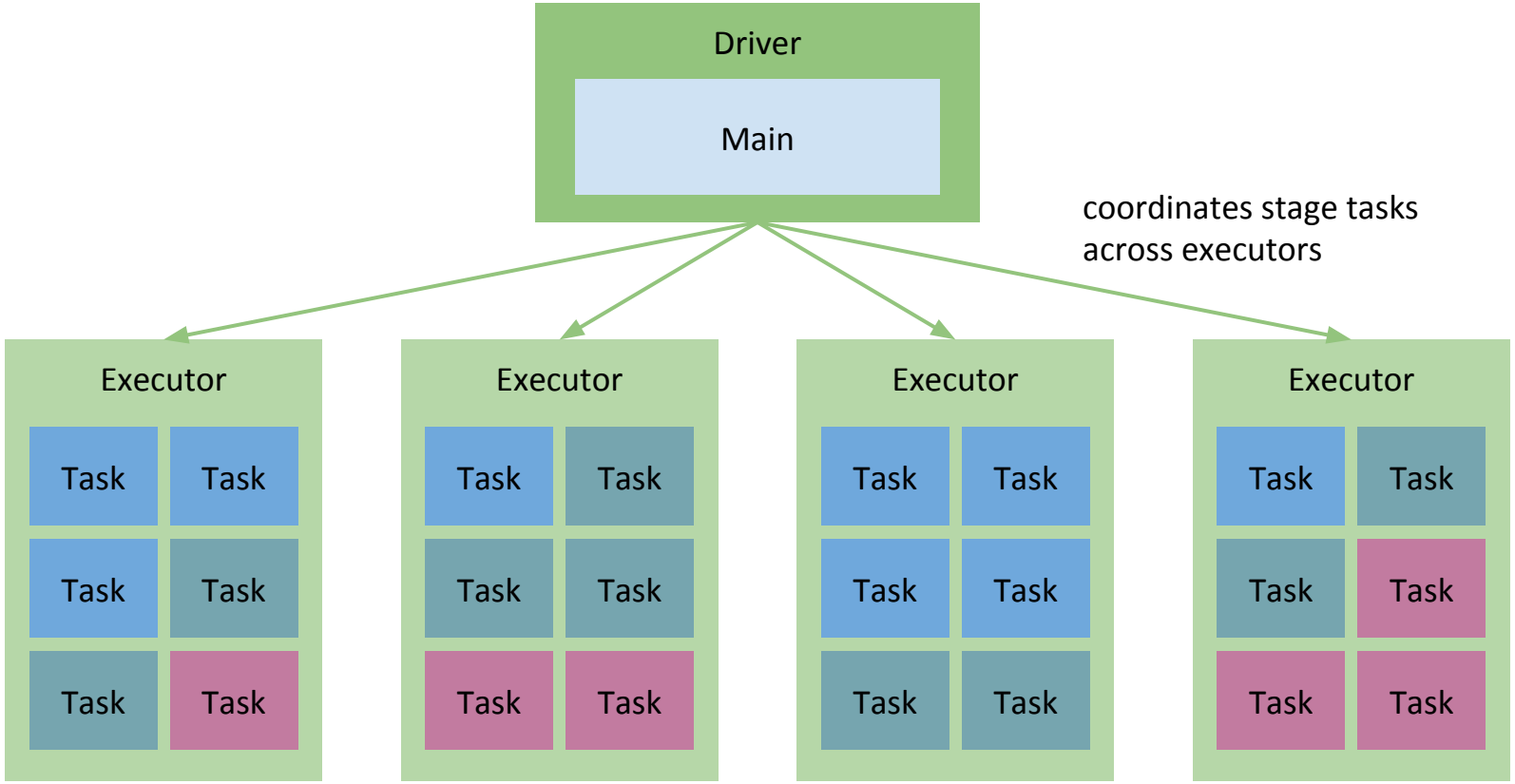
Spark Architecture



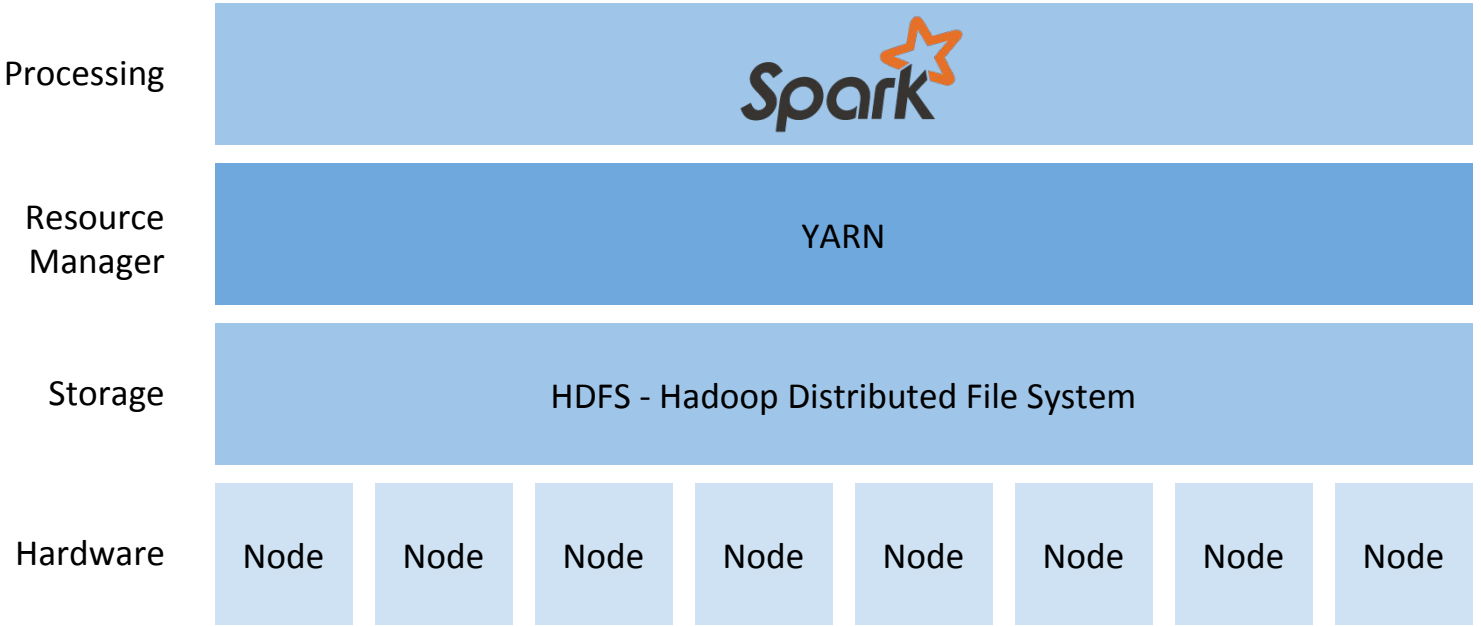
Spark Architecture



Spark Architecture



Spark on YARN



Configuration

export HADOOP_CONF_DIR="/opt/hadoop/hadoop_install/conf"

core-site.xml

hdfs-site.xml

yarn-site.xml

Configuration

spark.yarn.jar **hdfs:///user/hadoop/libs/spark-assembly.jar**

need to upload the file to HDFS

spark.eventLog.enabled **true**
spark.eventLog.dir **hdfs:///app-logs/spark/logs**
spark.yarn.historyServer.address **historyserver_host:18080**

needed if you want to analyse finished jobs

Executor configuration

spark.executor.cores **4**

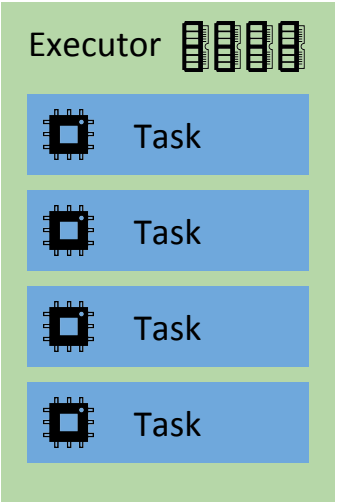
the number of tasks that will execute each executor

spark.executor.memory **4g**

shared memory across all tasks

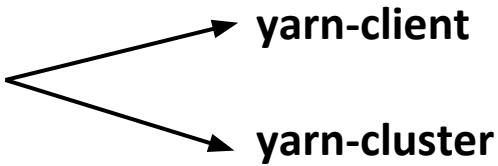
spark.yarn.executor.memoryOverhead **614m**

15-20% of total executor memory

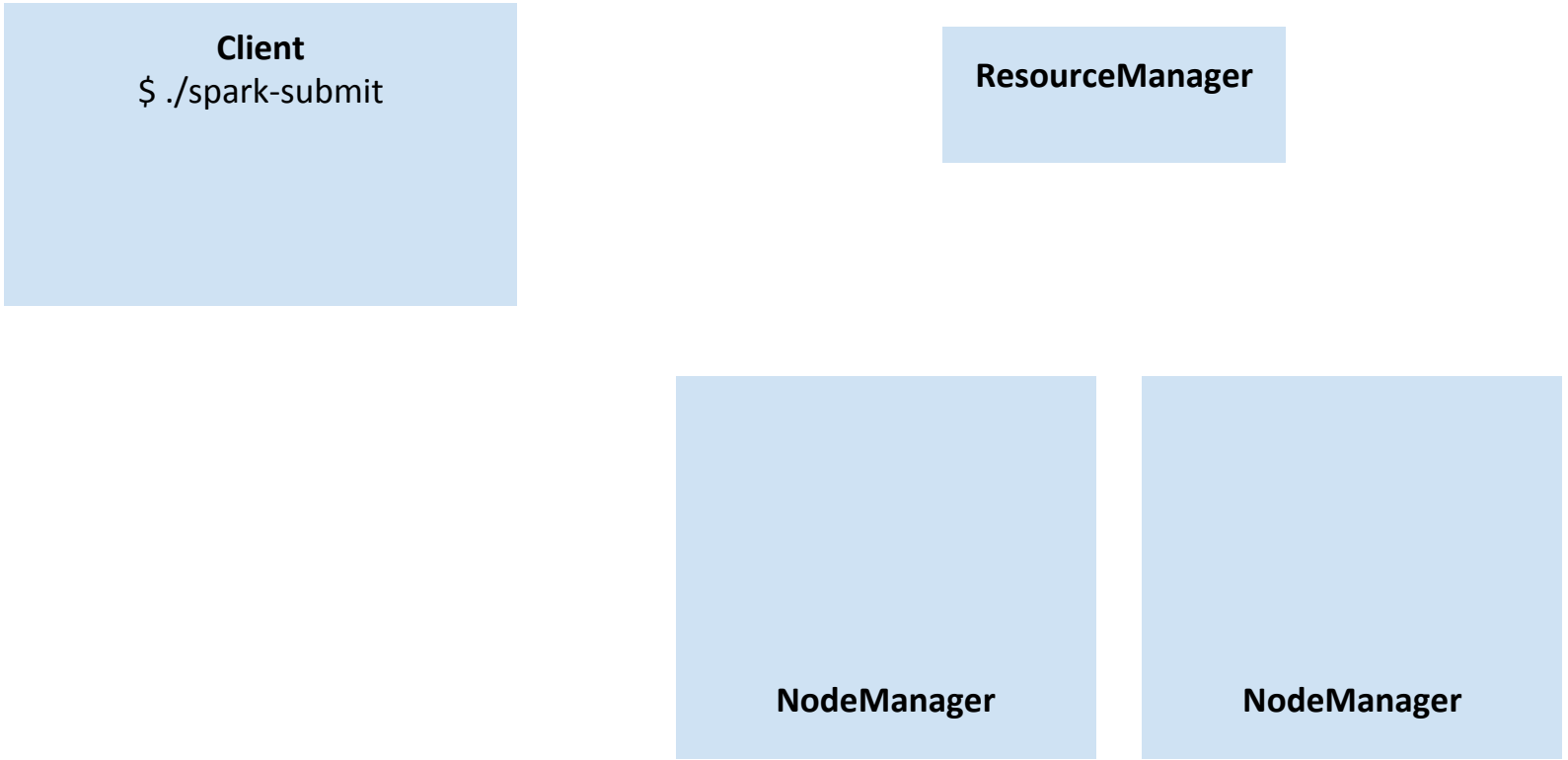


Deployment

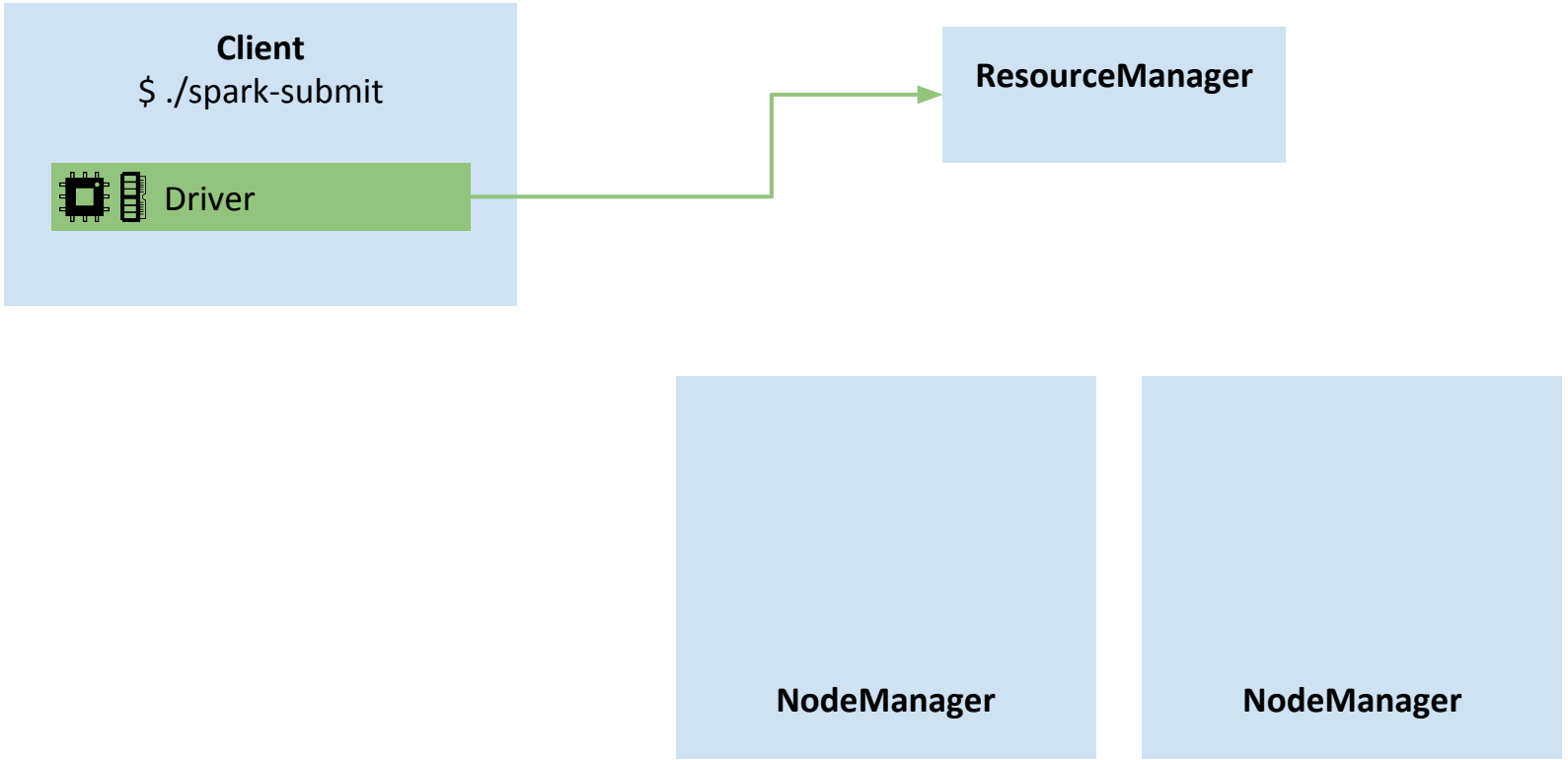
```
$ ./spark-submit
      --class my.main.class
      --master {deploy-mode}
      my-jar.jar
      arg1 arg2 arg3 ...
```



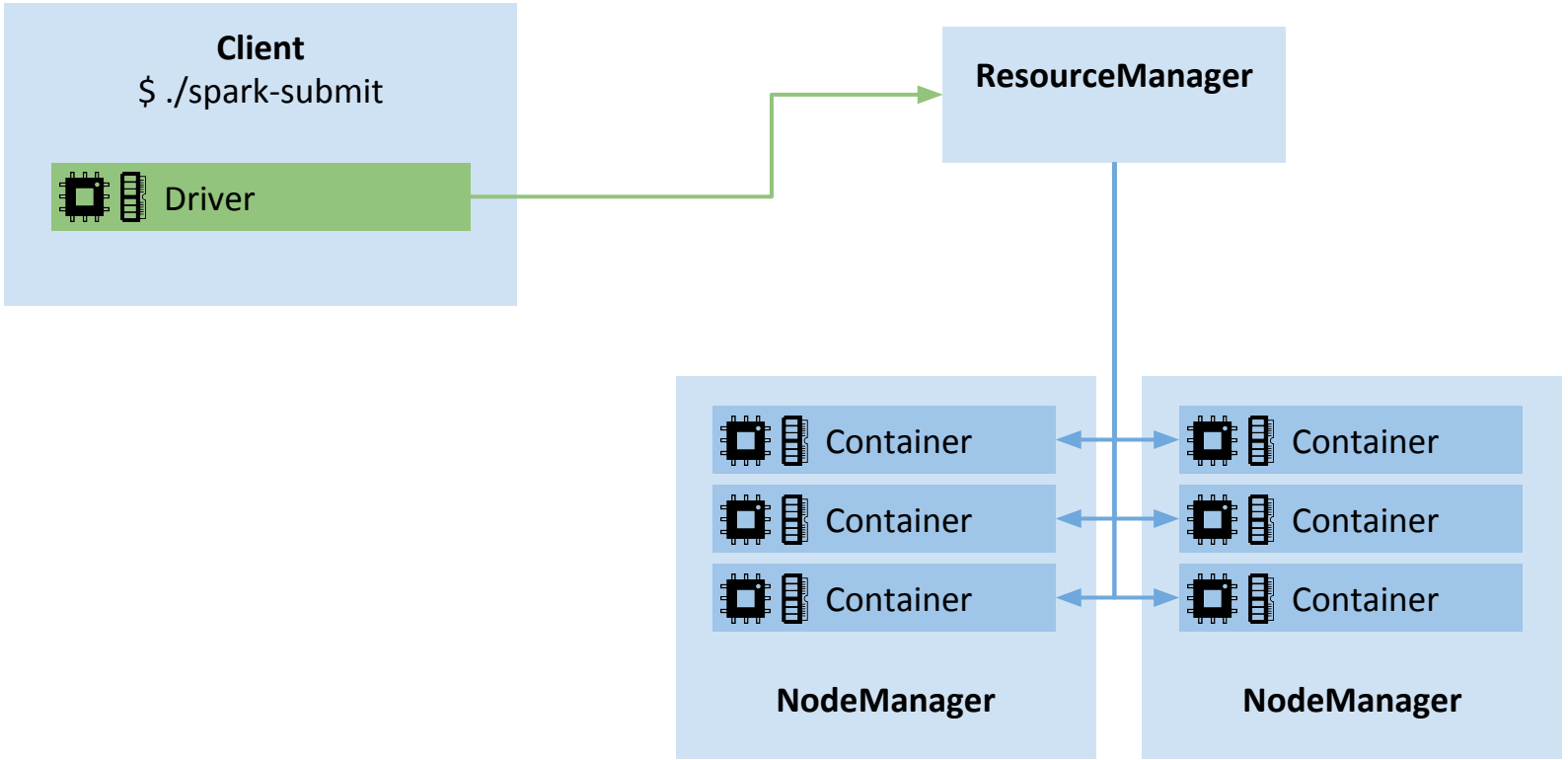
--master yarn-client



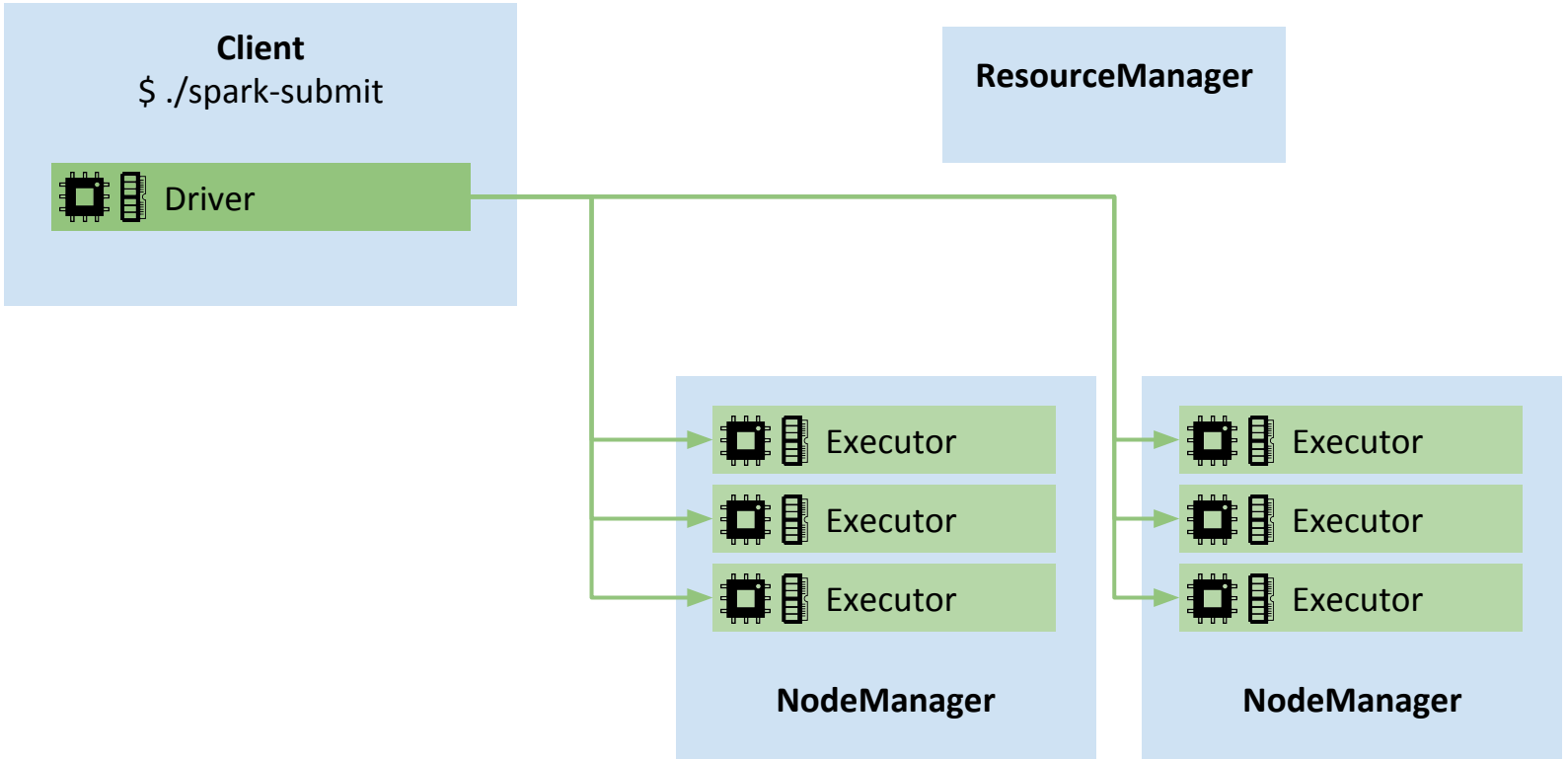
--master yarn-client



--master yarn-client



--master yarn-client



Demo

--master yarn-cluster

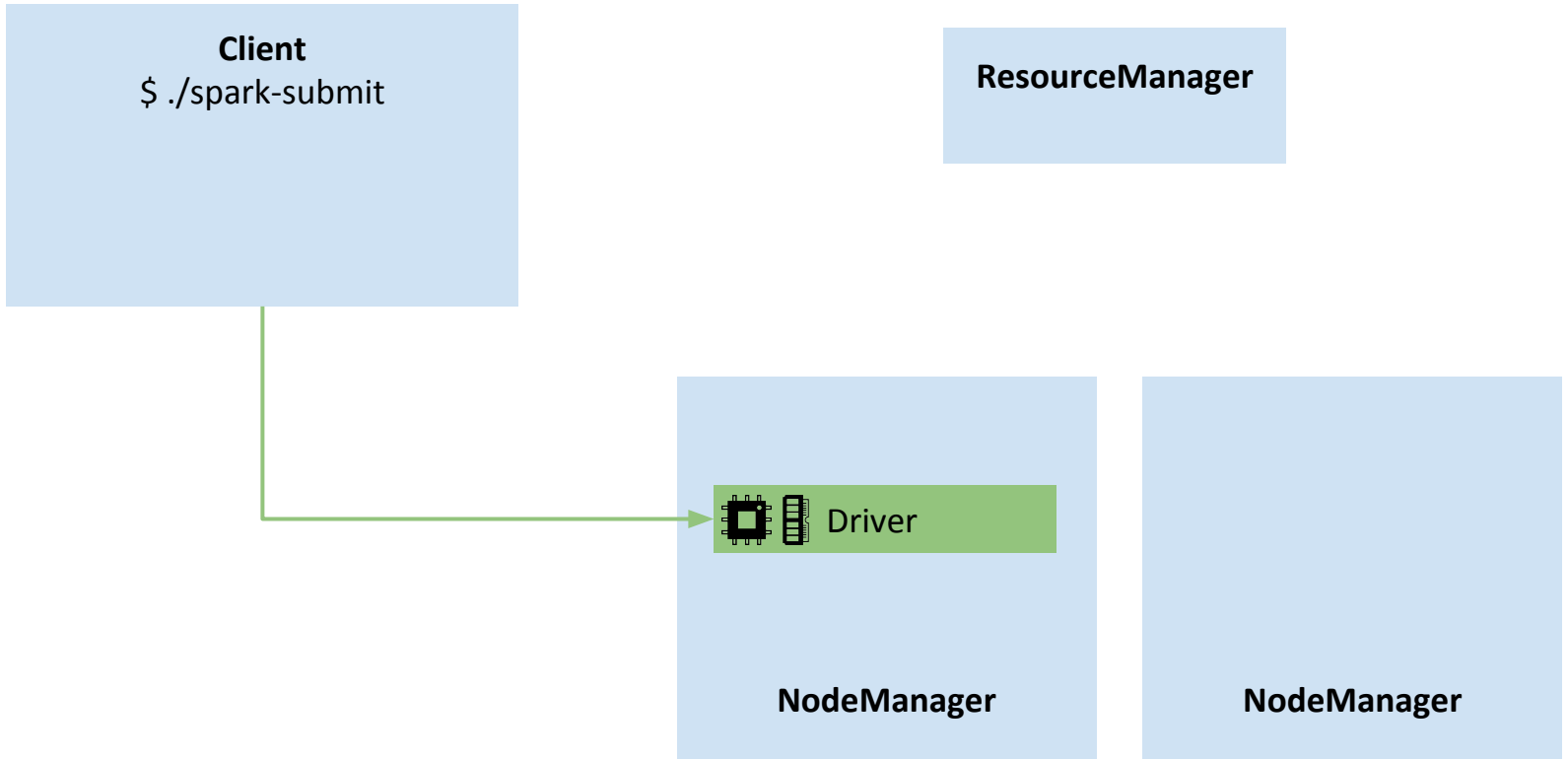
Client
$ ./spark-submit

ResourceManager

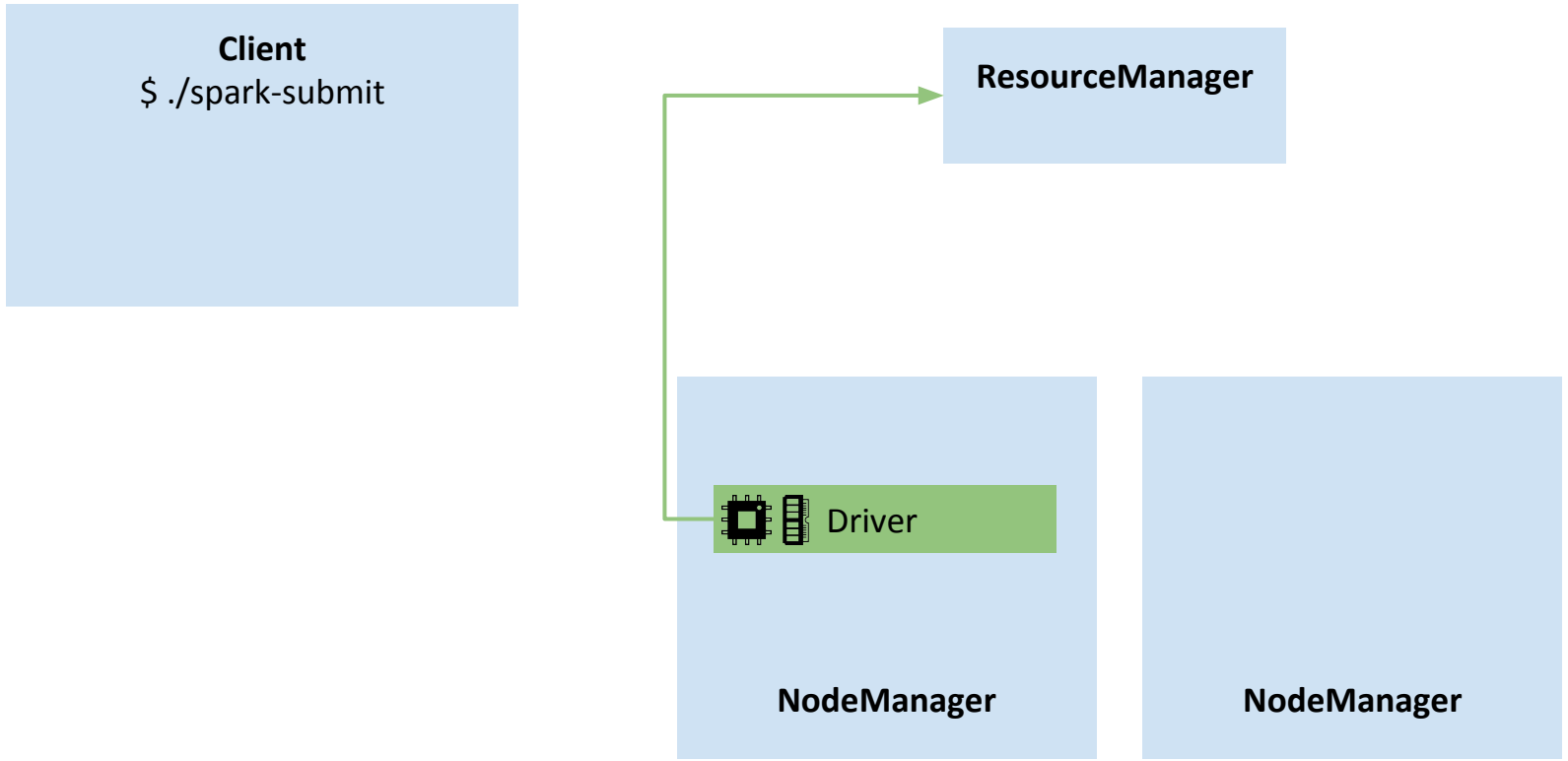
NodeManager

NodeManager

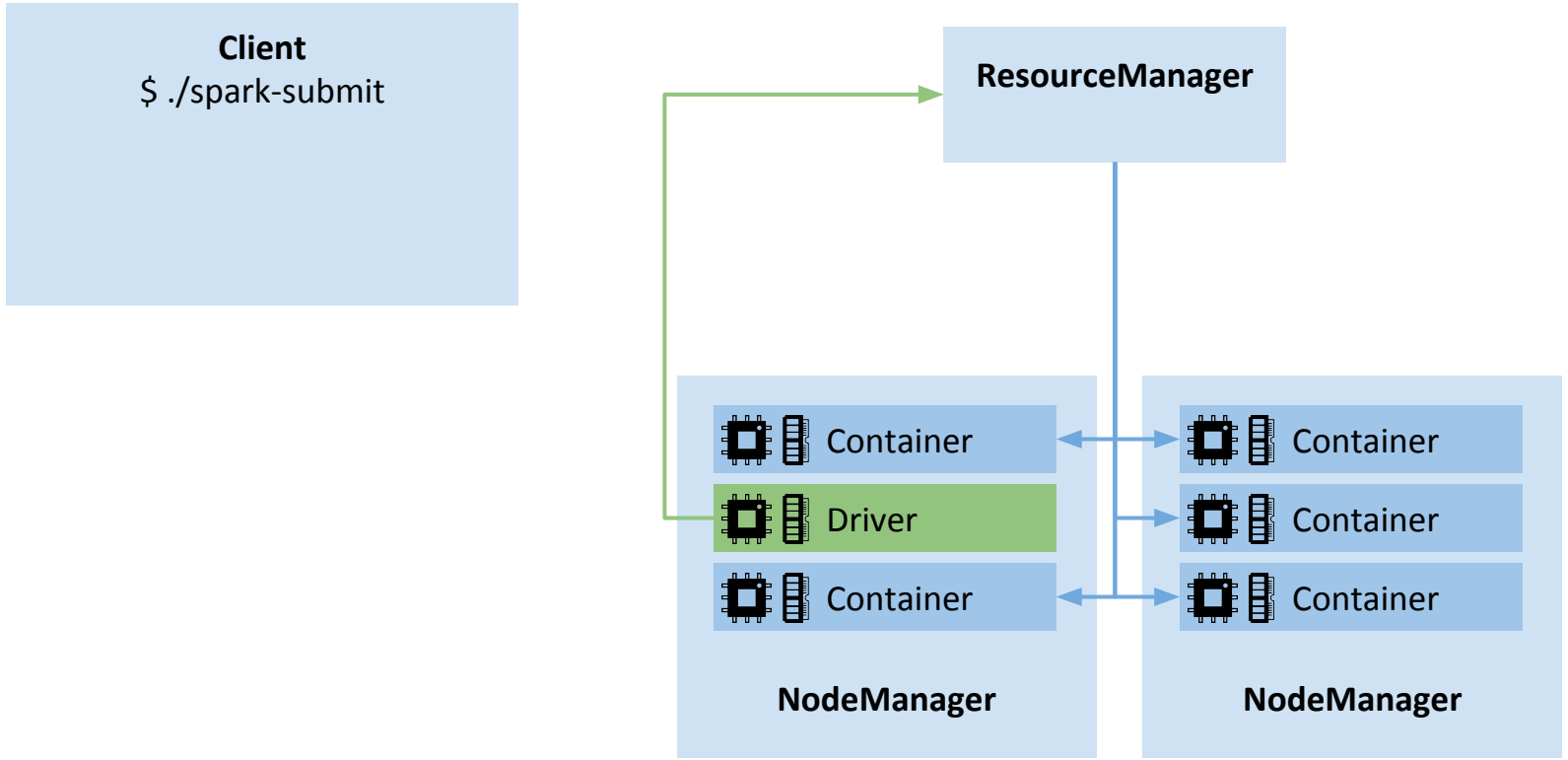
--master yarn-cluster



--master yarn-cluster



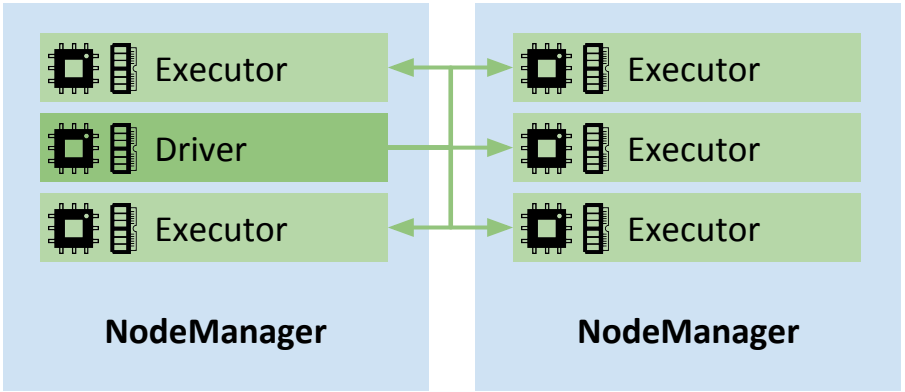
--master yarn-cluster



--master yarn-cluster

Client
$ ./spark-submit

ResourceManager



Demo

Static allocation

spark.executor.instances 10

it will allocate this fixed number of executors

Static allocation

Dynamic allocation

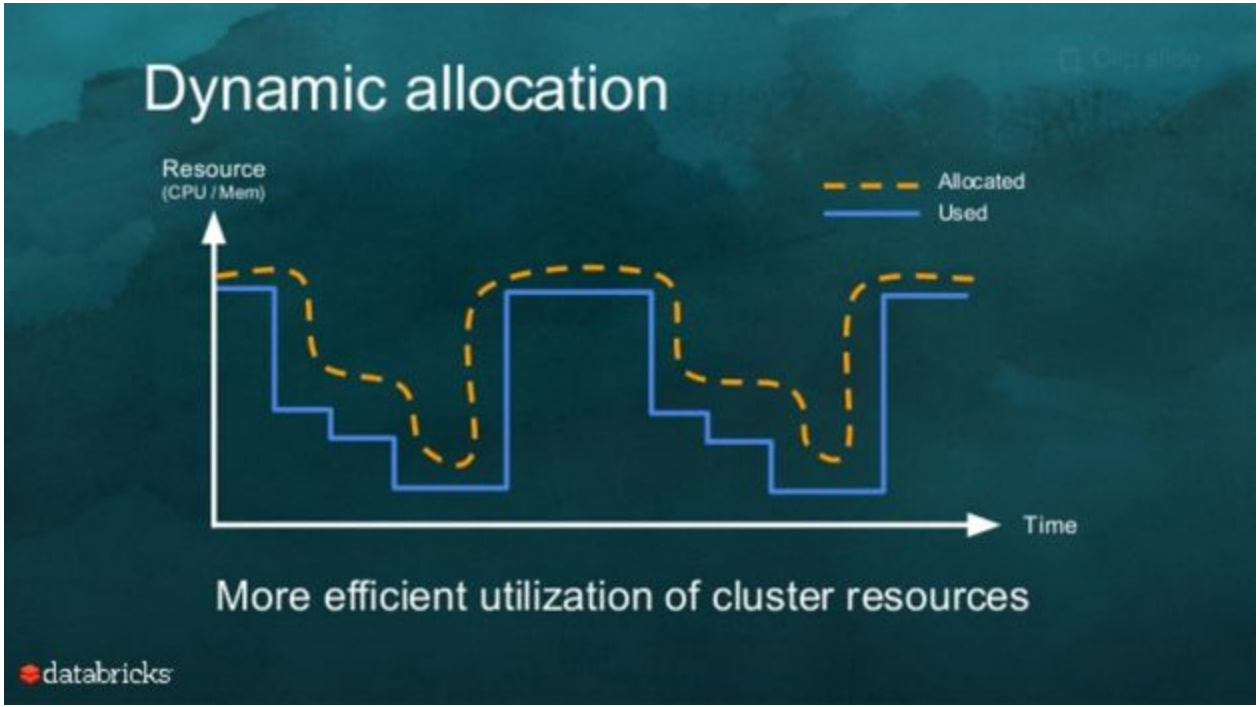
spark.shuffle.service.enabled **true**

also need to install an auxiliary services to the nodemanagers

spark.dynamicAllocation.enabled **true**
spark.dynamicAllocation.initialExecutors **0**
spark.dynamicAllocation.minExecutors **1**
spark.dynamicAllocation.maxExecutors **10**

will allocate and release executors as needed

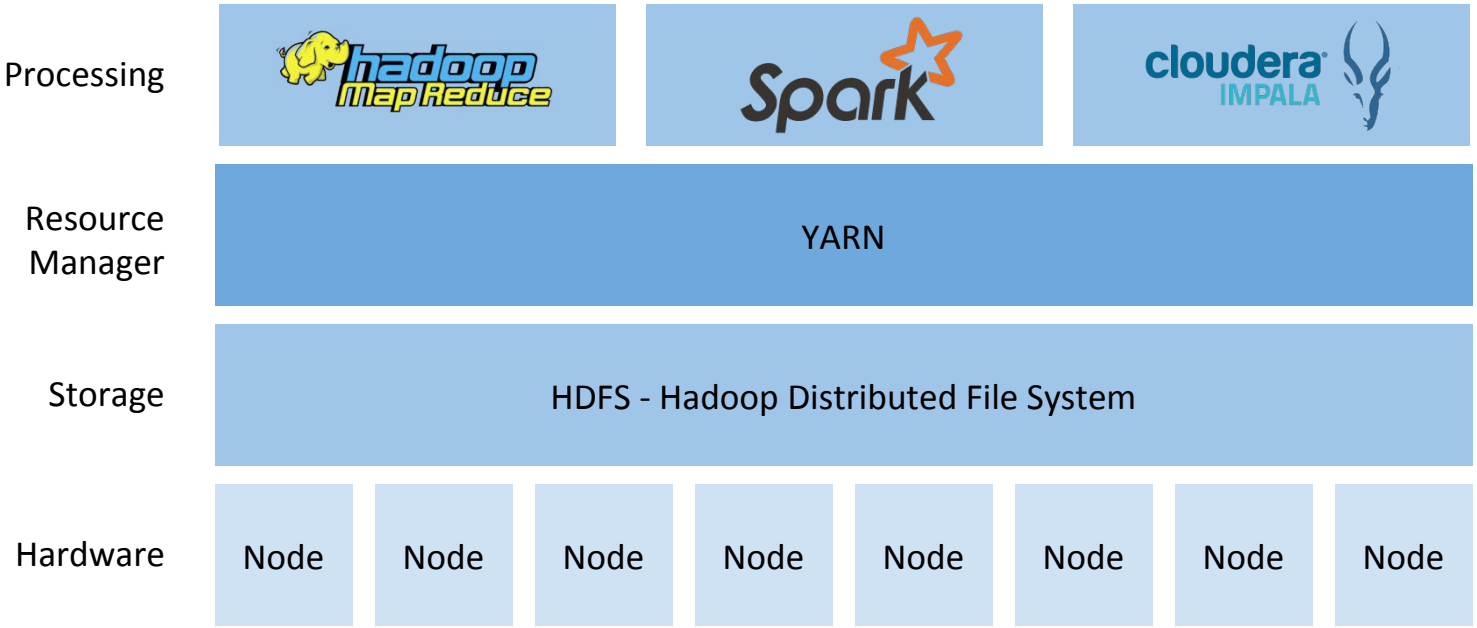
Dynamic allocation



Demo


trovit

Trovit YARN cluster



Trovit

Search engine

Business Intelligence

Mailing

Push Notifications

Online Media Buying

Questions?

Thank You

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