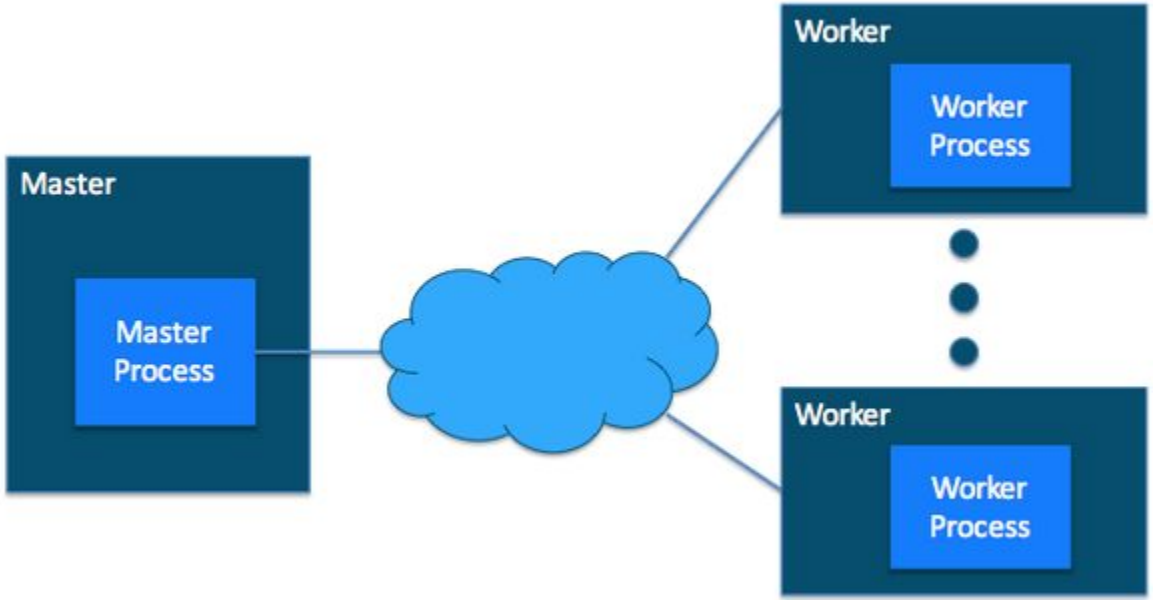
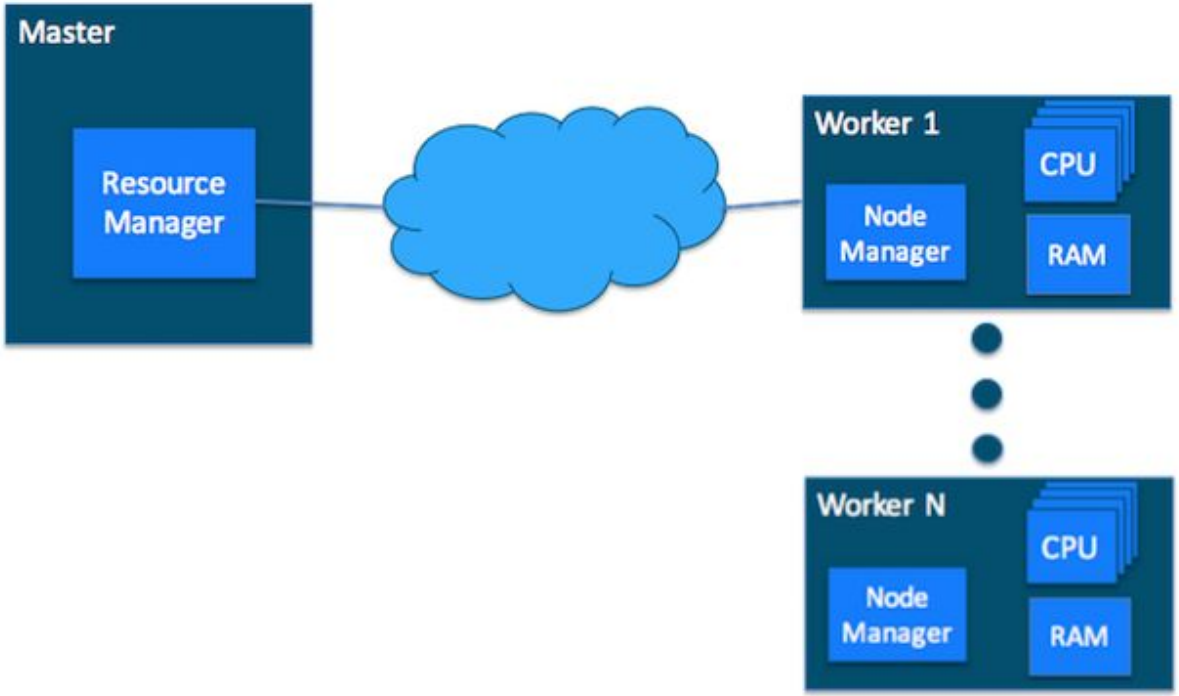
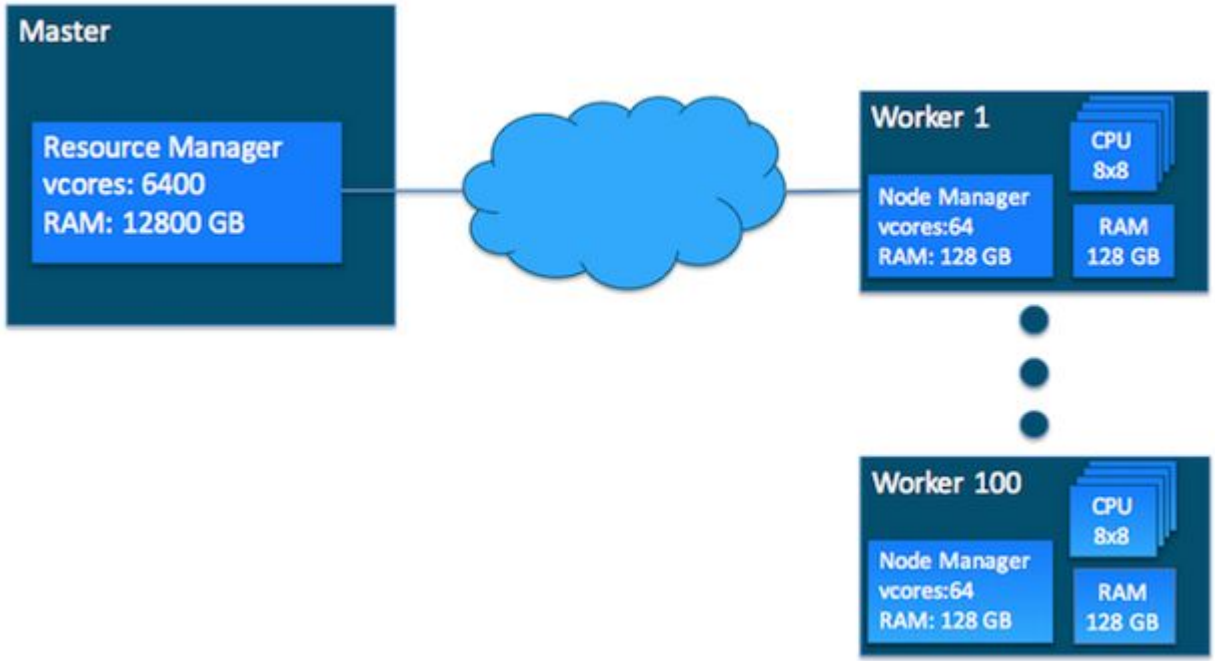
General Cluster Architecture



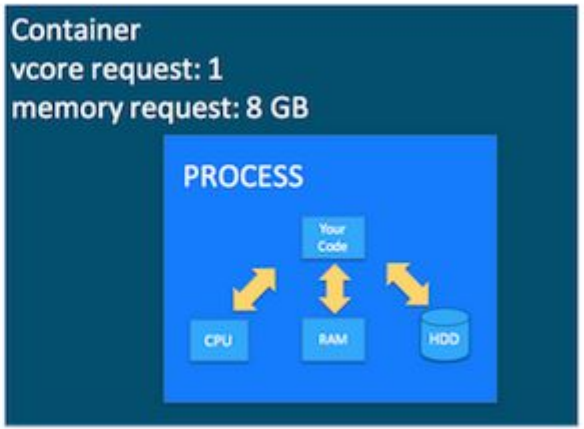
Resource Manager and Node manager



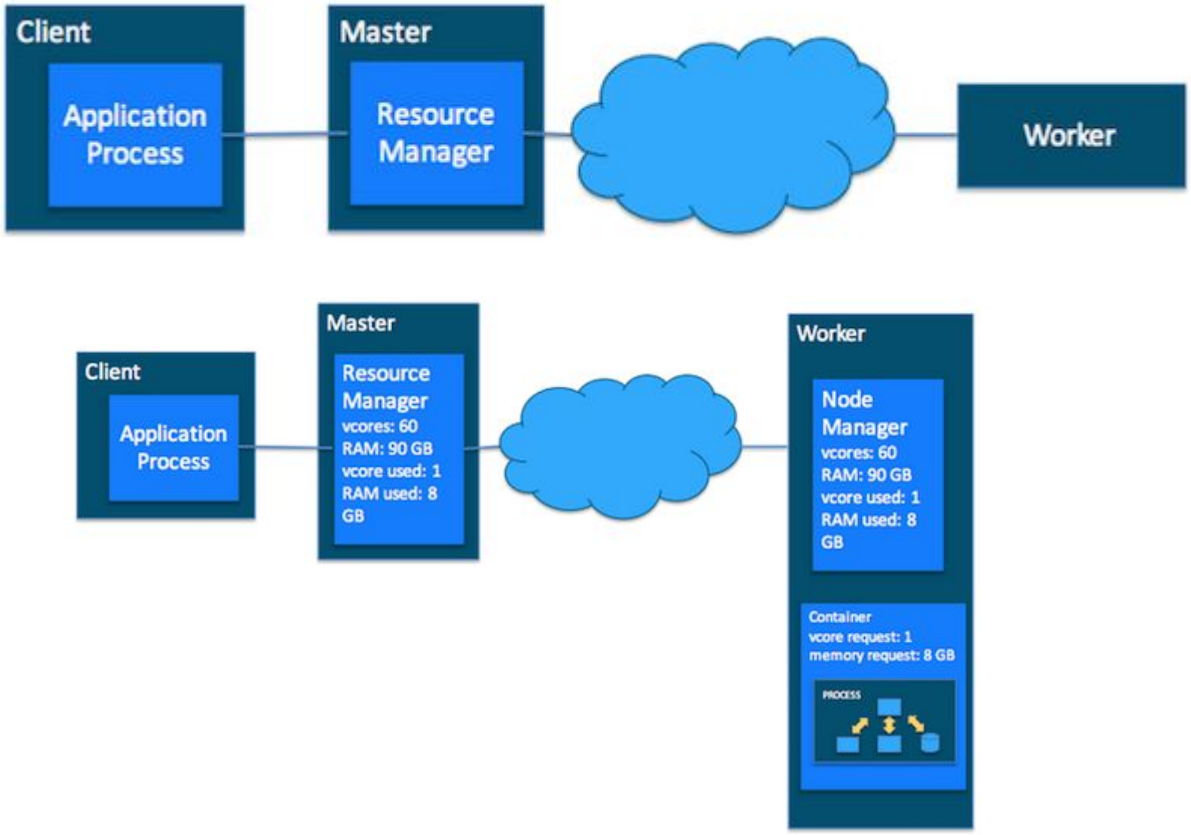
Vcores and Memory



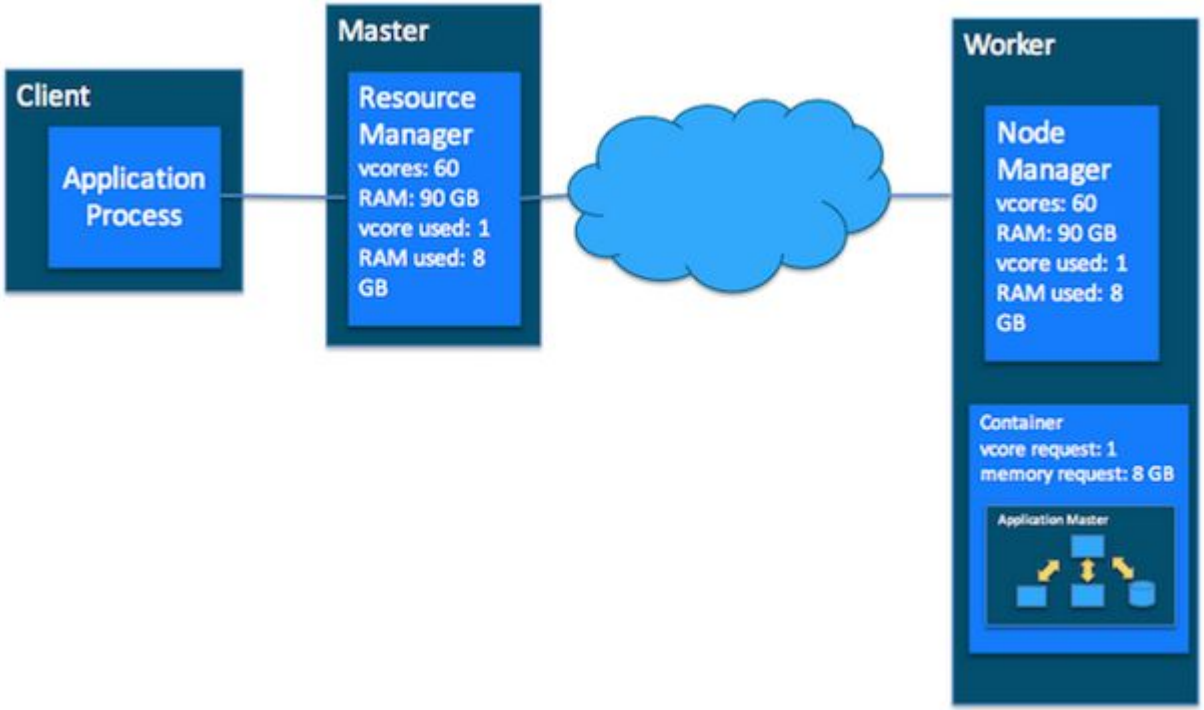
Container, Request, Task, Process



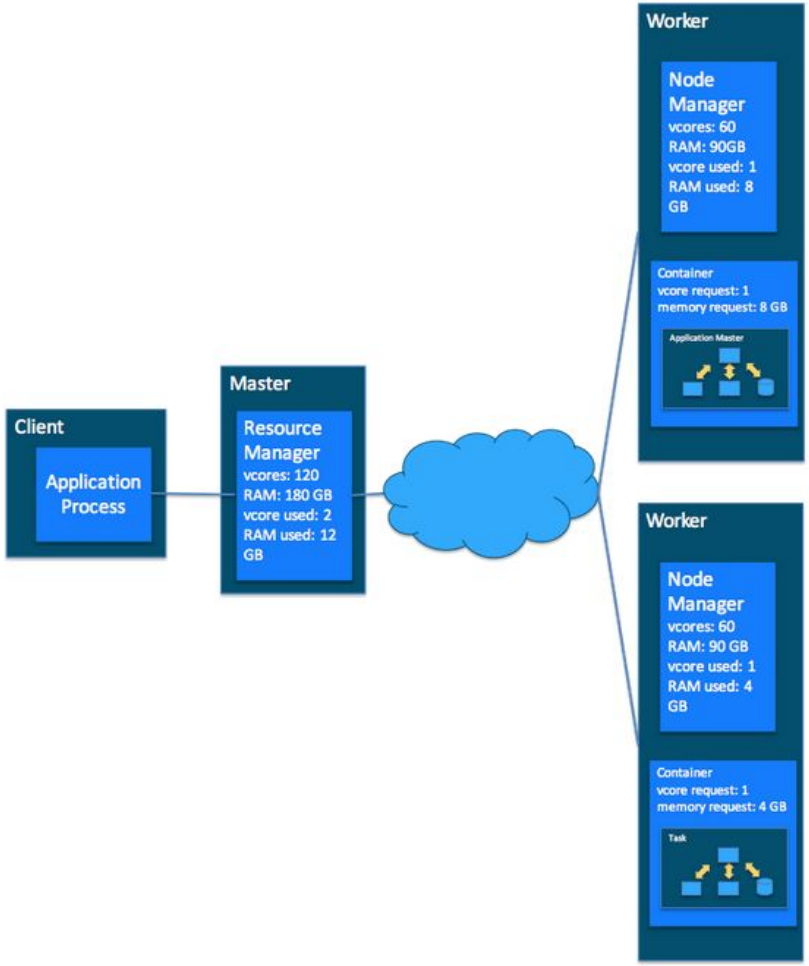
Application Starting



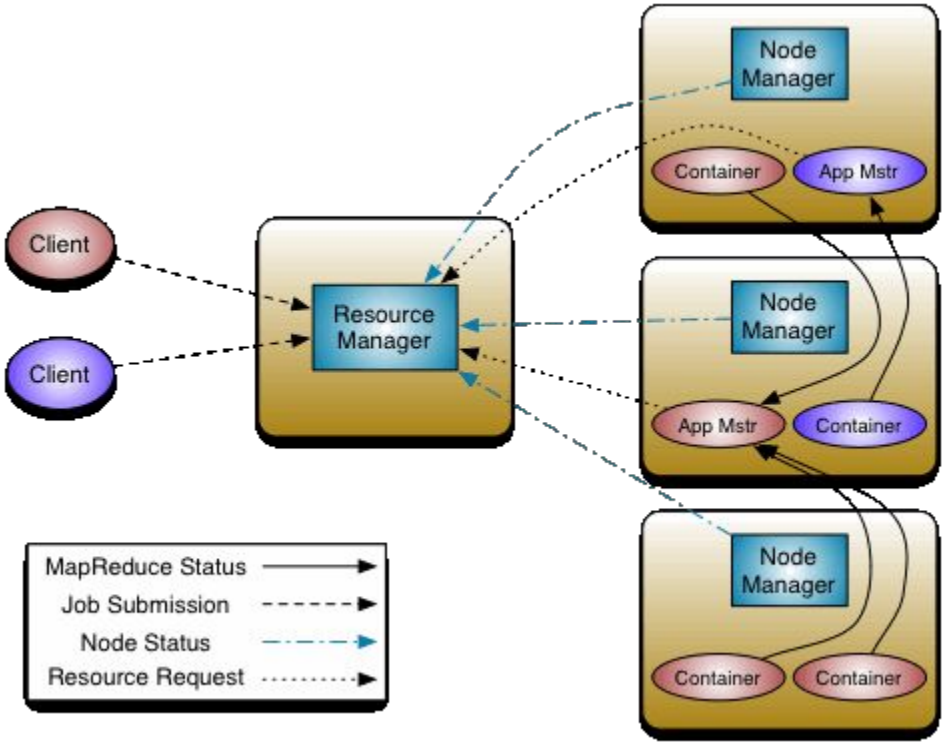
Application Master Container



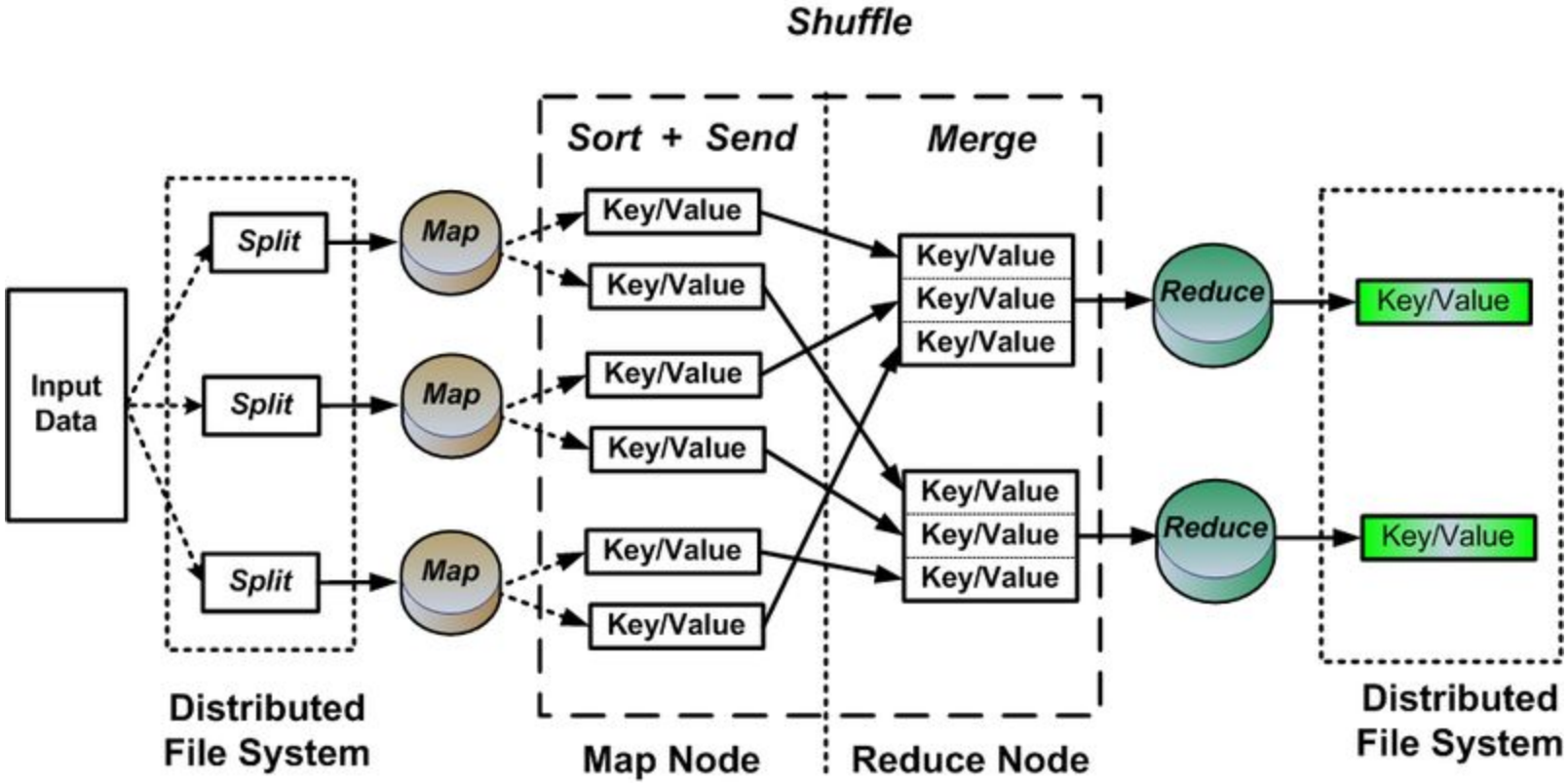
Task Containers

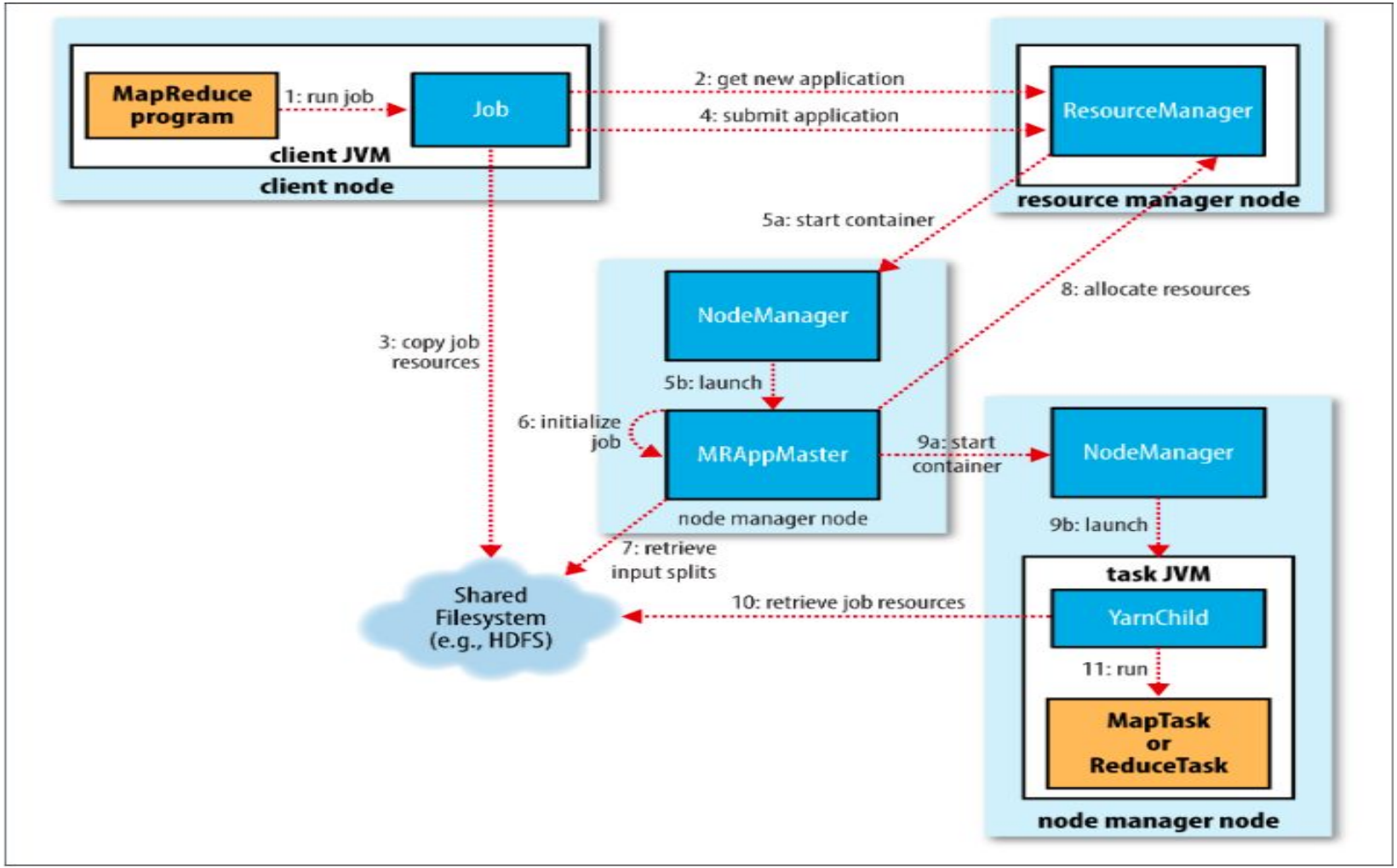


YARN Architecture

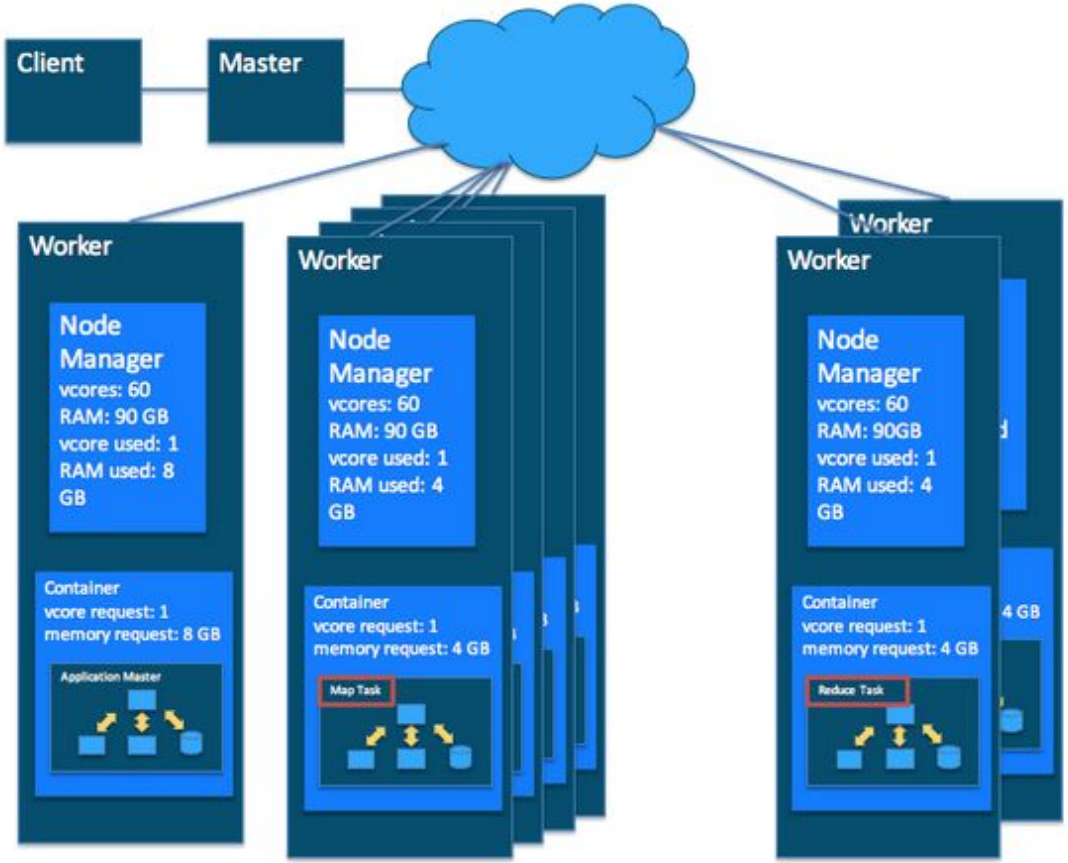


MapReduce Architecture

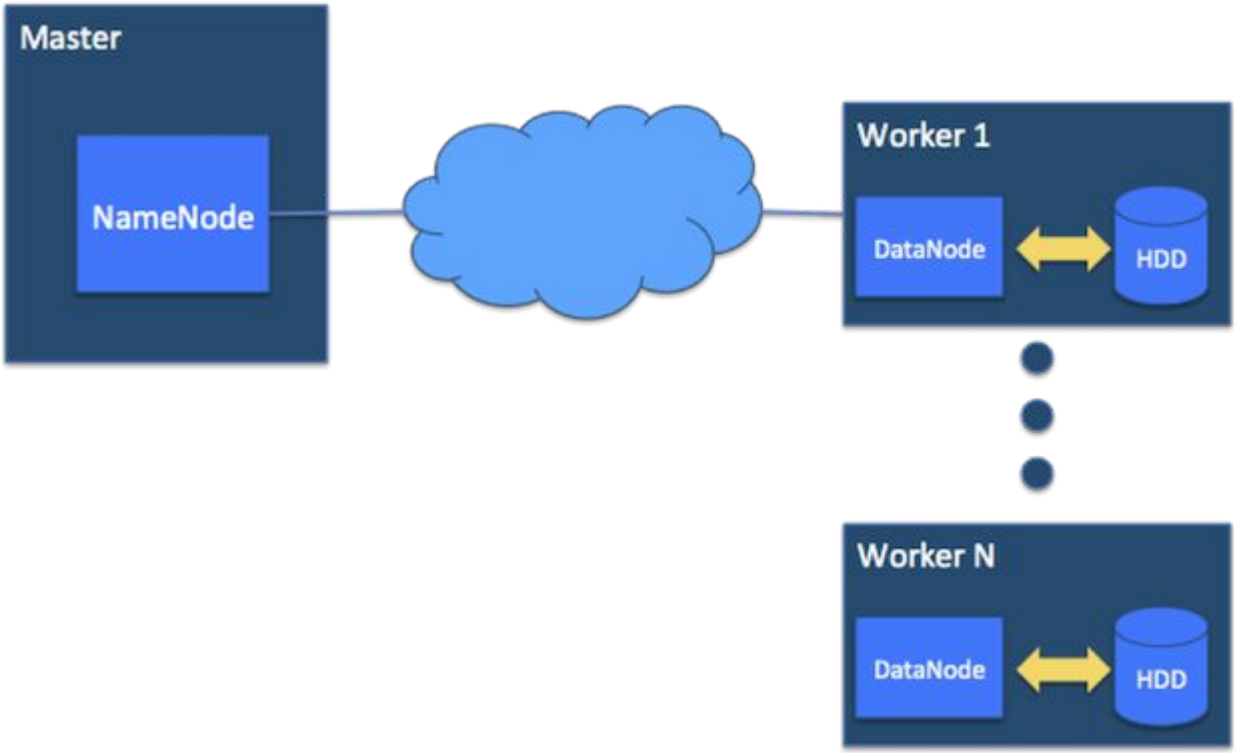



MapReduce program
1: run job
Job
client JVM
client node
2: get new application
4: submit application
ResourceManager
resource manager node
5a: start container
8: allocate resources
3: copy job resources
NodeManager
5b: launch
6: initialize job
MRAppMaster
node manager node
7: retrieve input splits
Shared Filesystem (e.g., HDFS)
9a: start container
NodeManager
9b: launch
task JVM
YarnChild
10: retrieve job resources
11: run
MapTask or ReduceTask
node manager node

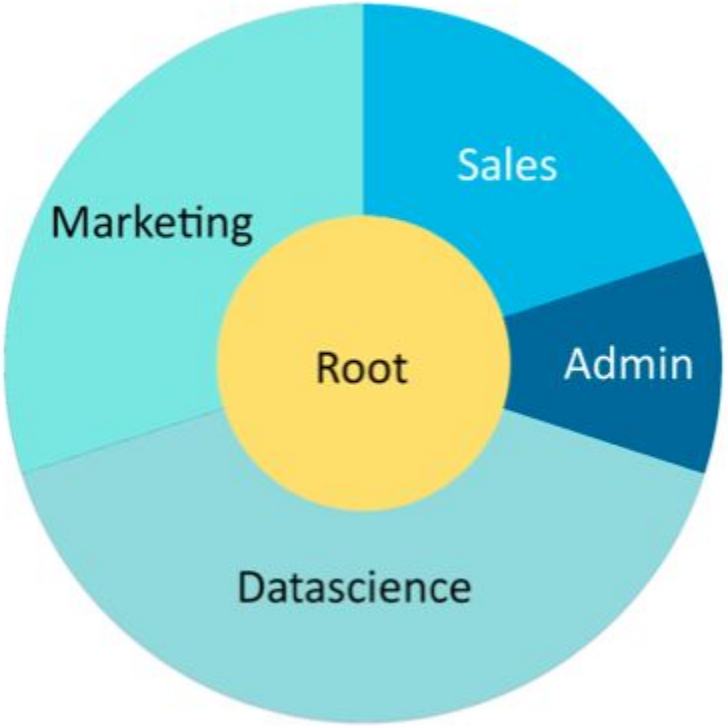
MR Application in Yarn



Resources Not Available to Yarn Apps

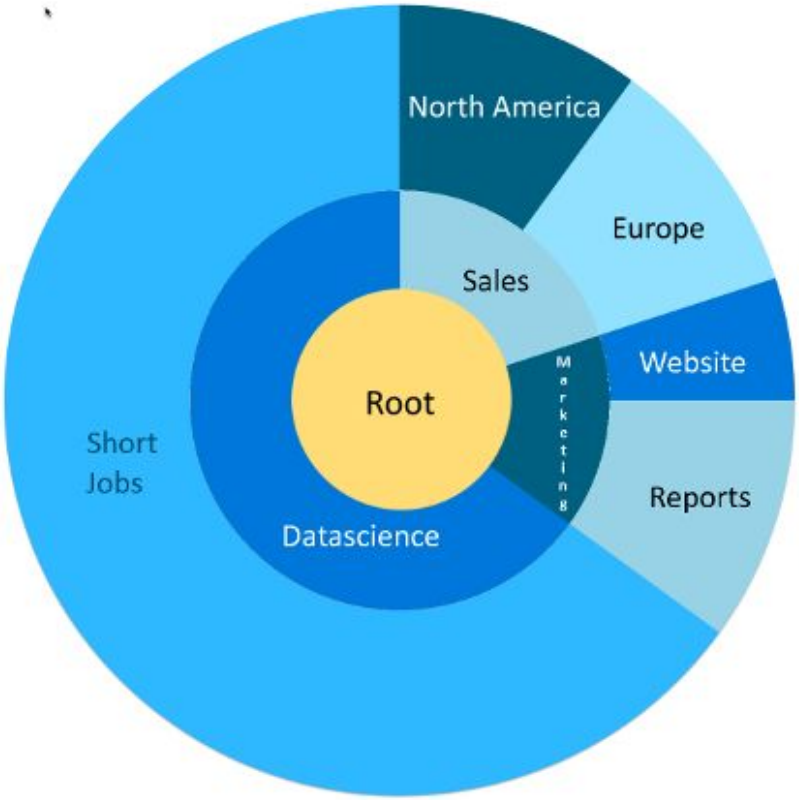


Fair Scheduler and Queues




```
<?xml version="1.0"?>
<allocations>
 <queue name="marketing">
  <weight>30.0</weight>
 </queue>
 <queue name="sales">
  <weight>20.0</weight>
 </queue>
 <queue name="datascience">
  <weight>40.0</weight>
 </queue>

 <queue name=”admin”>
  <aclSubmitApps>fred,greg</aclSubmitApps>
  <weight>10.0</weight>
 </queue>
</allocations>
```




```
<?xml version="1.0"?>
<allocations>
 <queue name="marketing">
  <weight>3.0</weight>
  <queue name="reports">
   <weight>40.0</weight>
  </queue>
  <queue name="website">
   <weight>20.0</weight>
  </queue>
 </queue>
 <queue name="sales">
  <weight>4.0</weight>
  <queue name="northamerica">
   <weight>30.0</weight>
  </queue>
  <queue name="europe">
   <weight>30.0</weight>
  </queue>
 </queue>
 <queue name="datascience">
  <weight>13.0</weight>
  <queue name="short_jobs">
   <weight>100.0</weight>
  </queue>
  <queue name="best_effort_jobs">
   <weight>0.0</weight>
  </queue>
 </queue>
</allocations>
```

```
<queue name="datascience">
    <maxRunningApps>16</maxRunningApps>
    <minResources>
        6799360 mb,  1660vcores
    </minResources>
    <maxResources>
        12238848 mb, 2988vcores
    </maxResources>
    <weight>4.0</weight>
    <schedulingPolicy>fair</schedulingPolicy>
</queue>
```