SPARK SUMMIT 2017

Virtualizing Spark on VMware vSphere

Justin Murray, VMware

Why Virtualize Spark?

Use Cases : Virtualization of Big Data

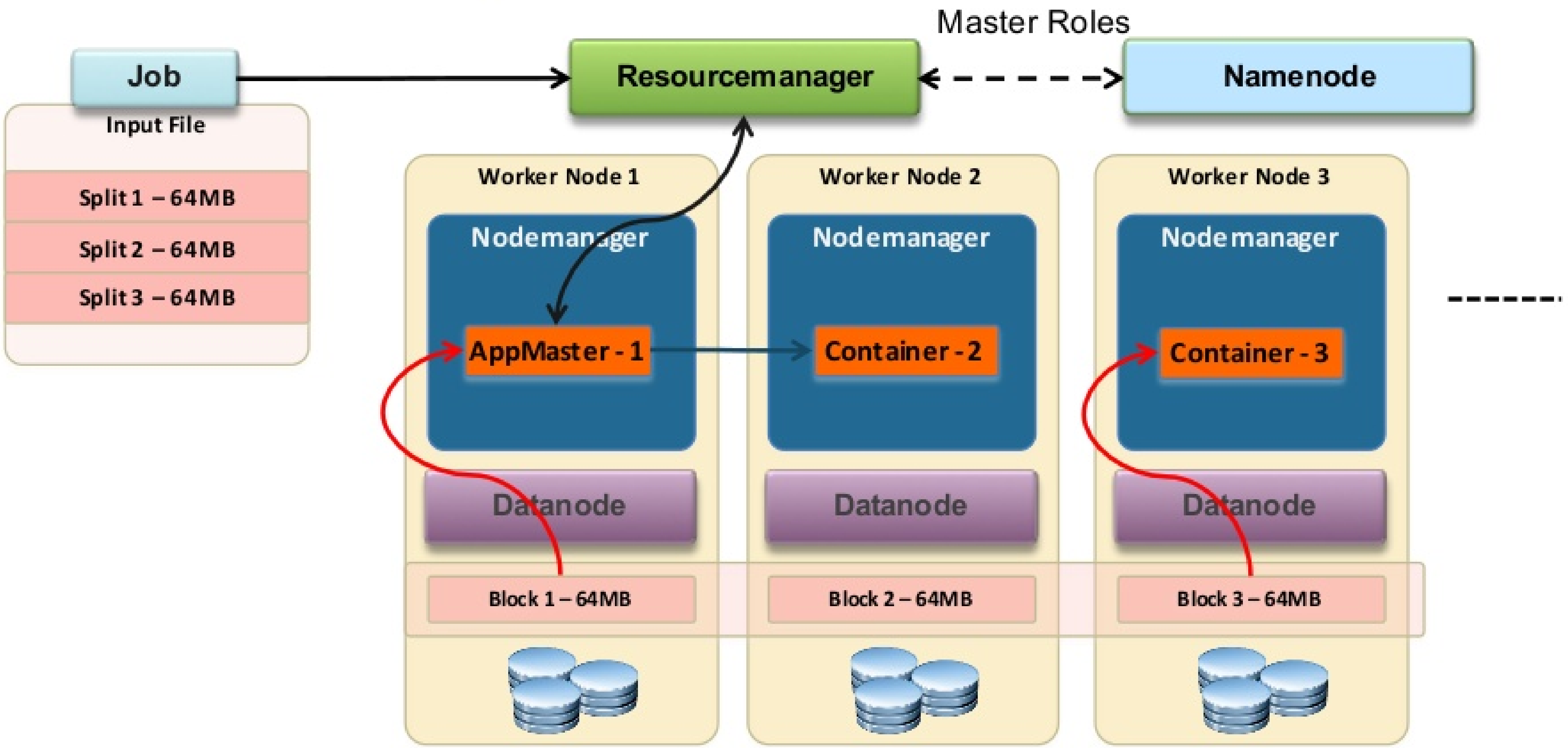
- IT wants to provide **Spark clusters as a service** on-demand for its end users

- Enterprises have development, test, pre-prod staging and production clusters that are required to be separated from each other and provisioned independently

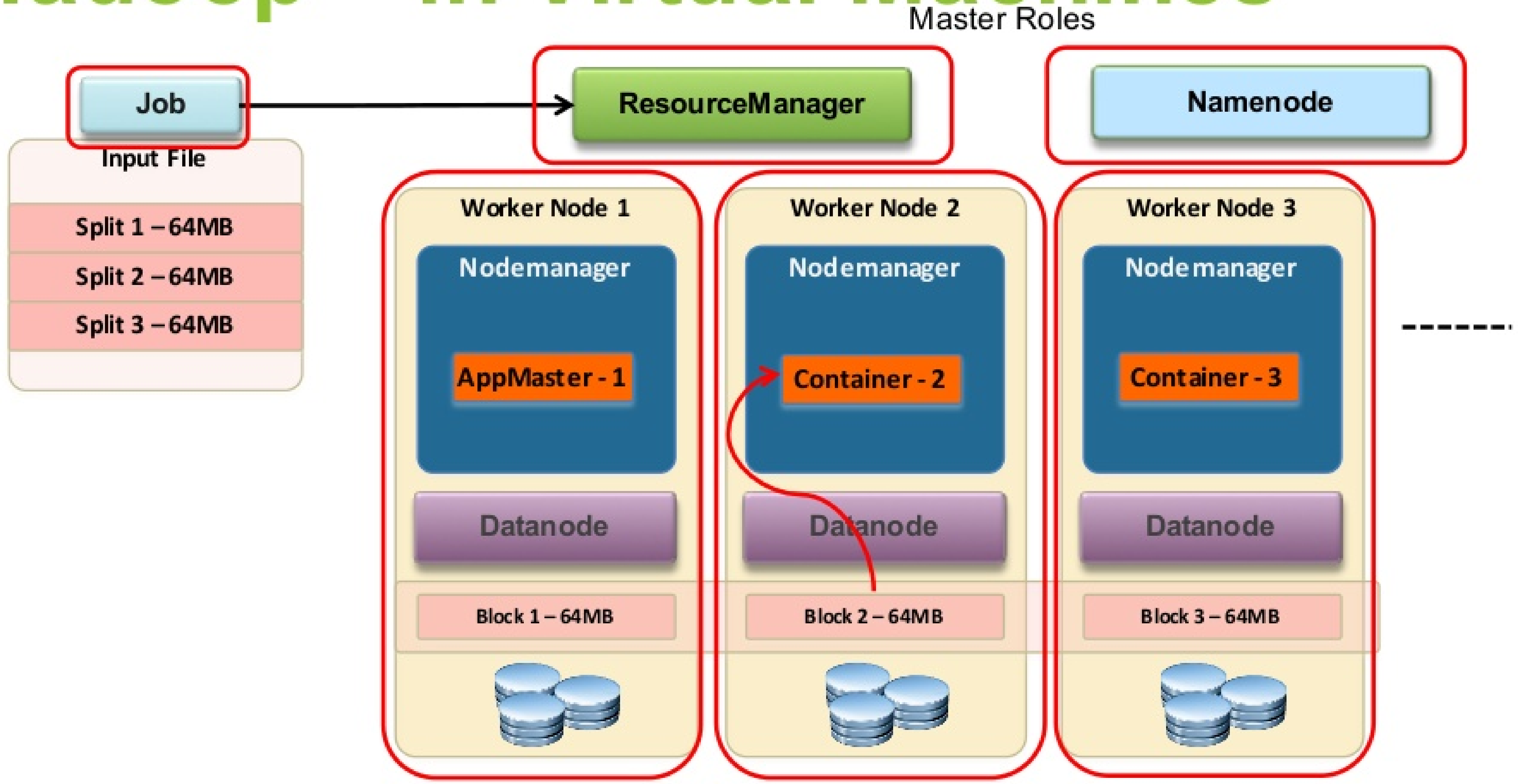
- Organizations need different versions of Spark to be available to different teams - with possibly different services available

- Enterprises do not wish to dedicate a specific set of hardware to each different requirement above, and want to reduce overall costs

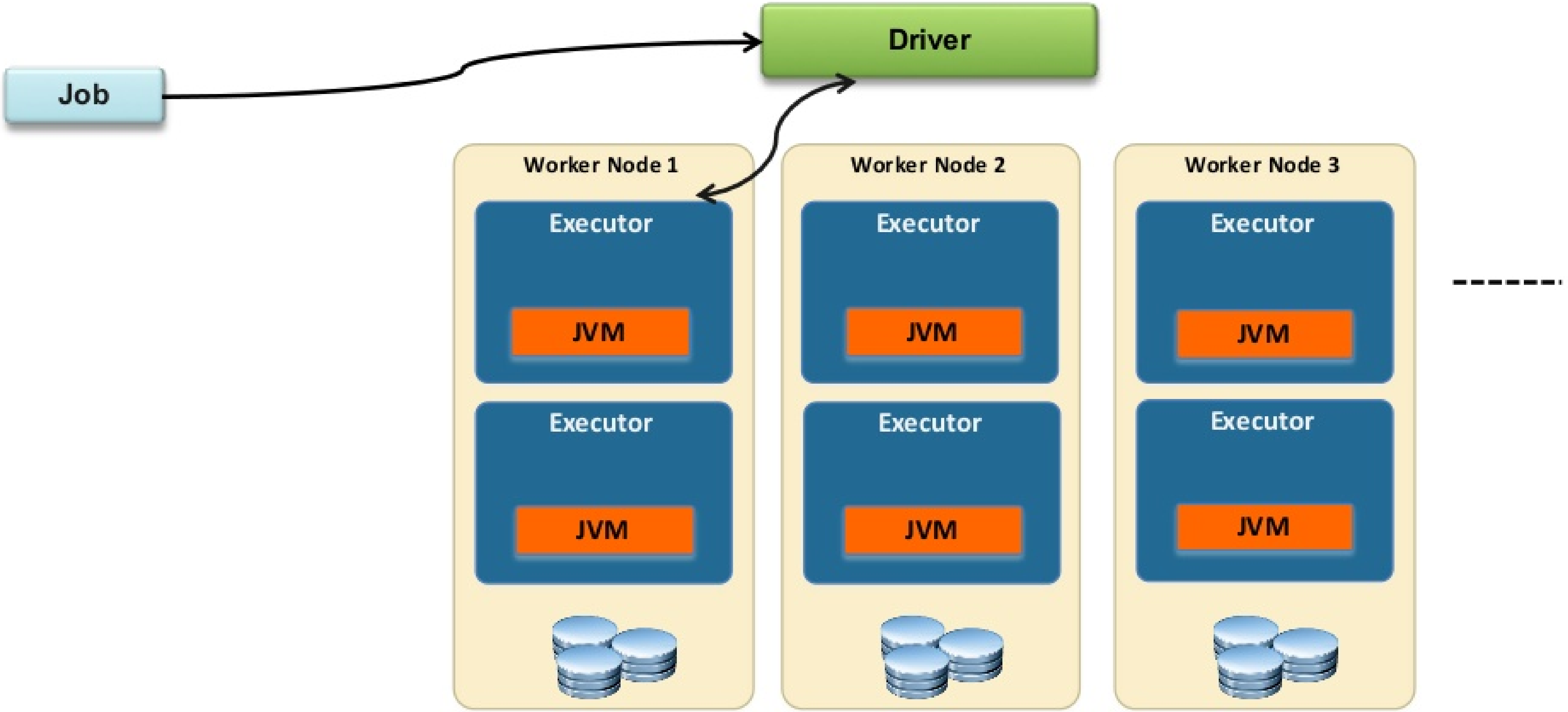
The Traditional Hadoop Architecture



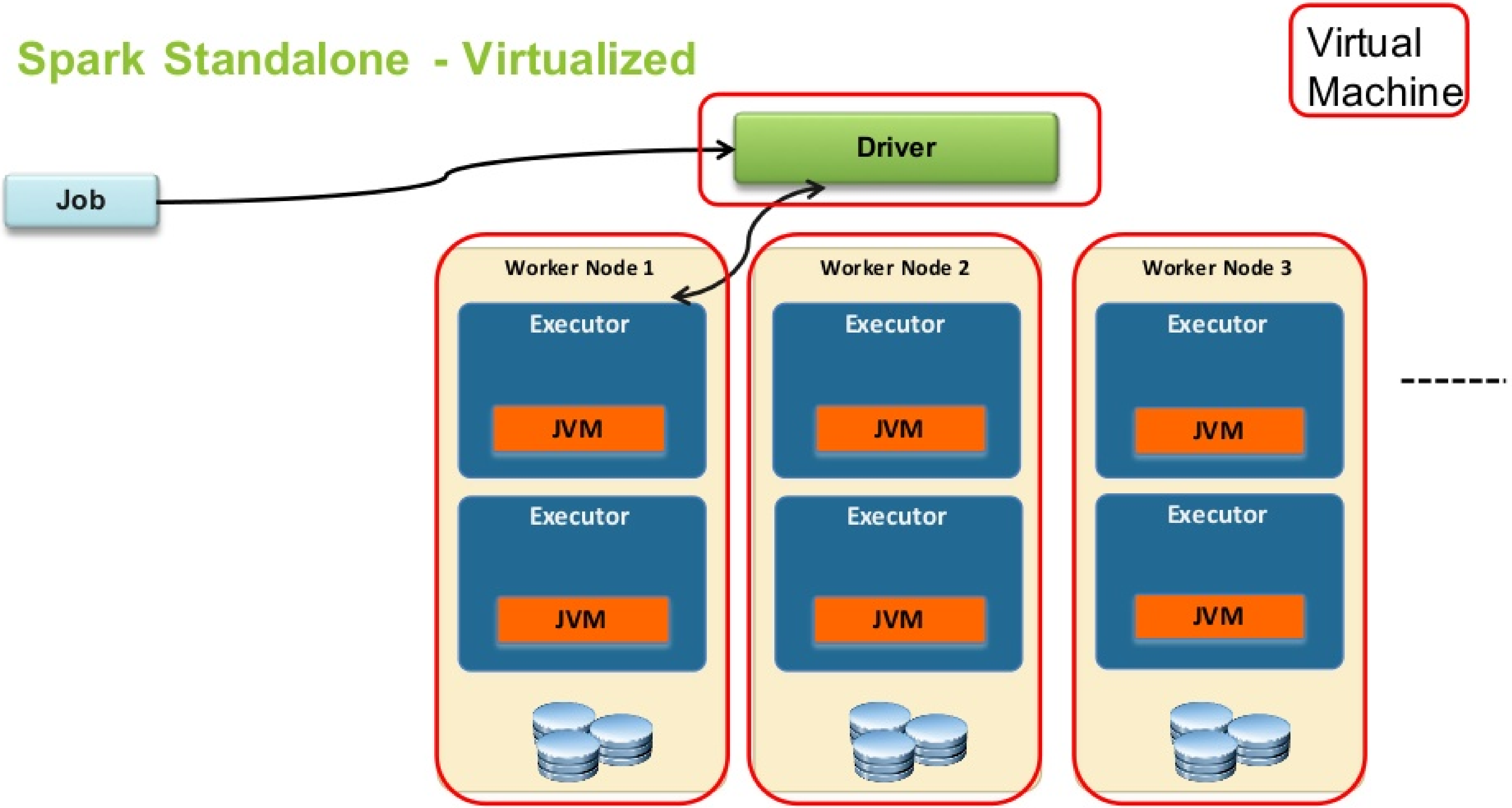
Hadoop – in Virtual Machines



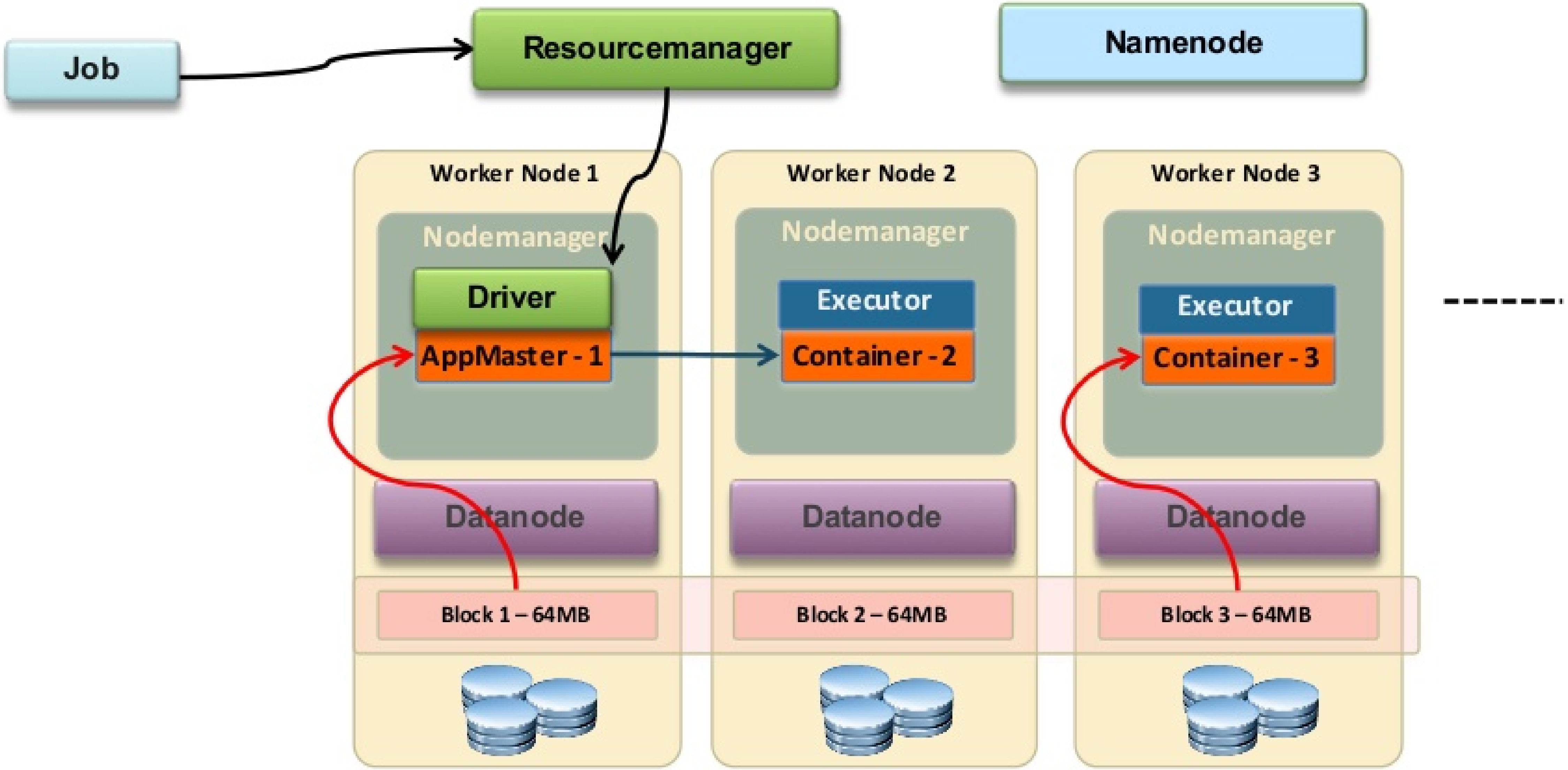
The Spark Architecture – Standalone



Spark Standalone - Virtualized

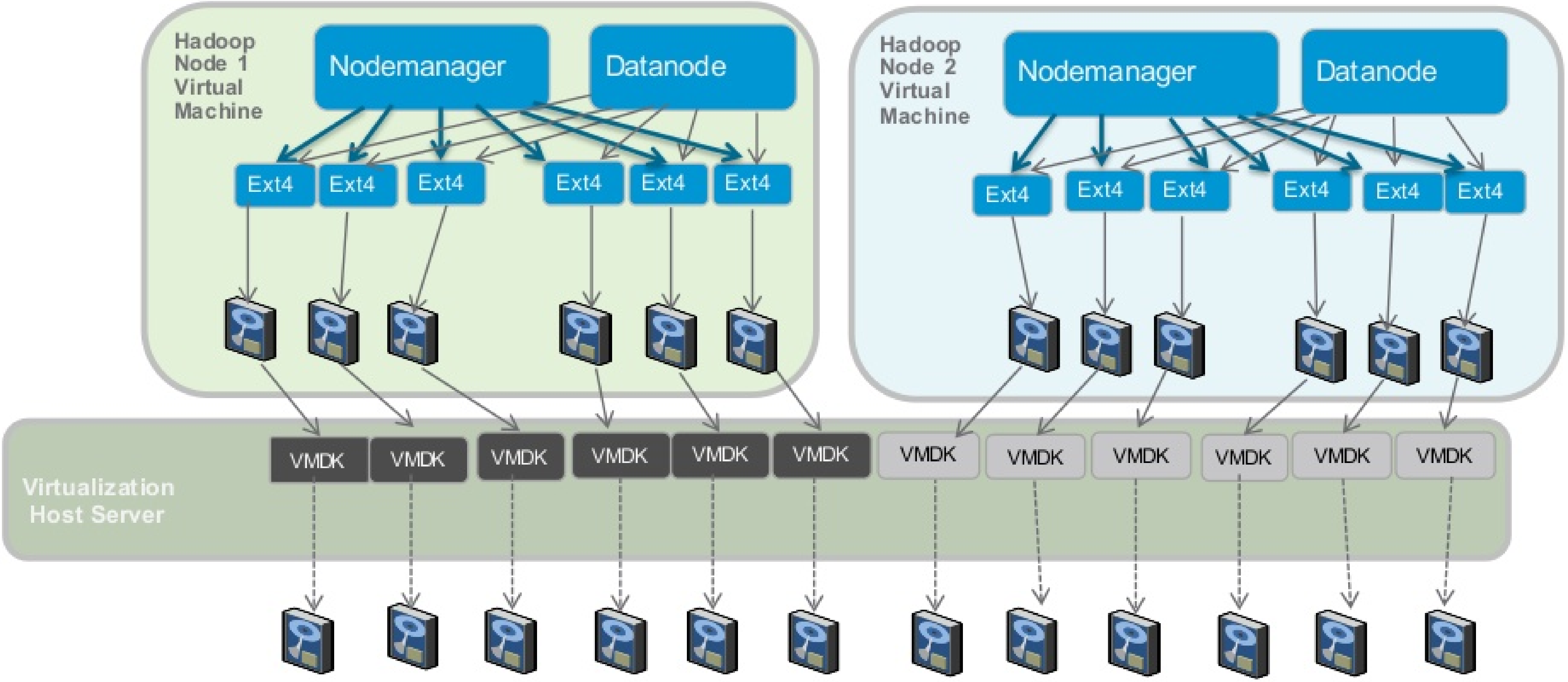


The Spark Architecture (on YARN)



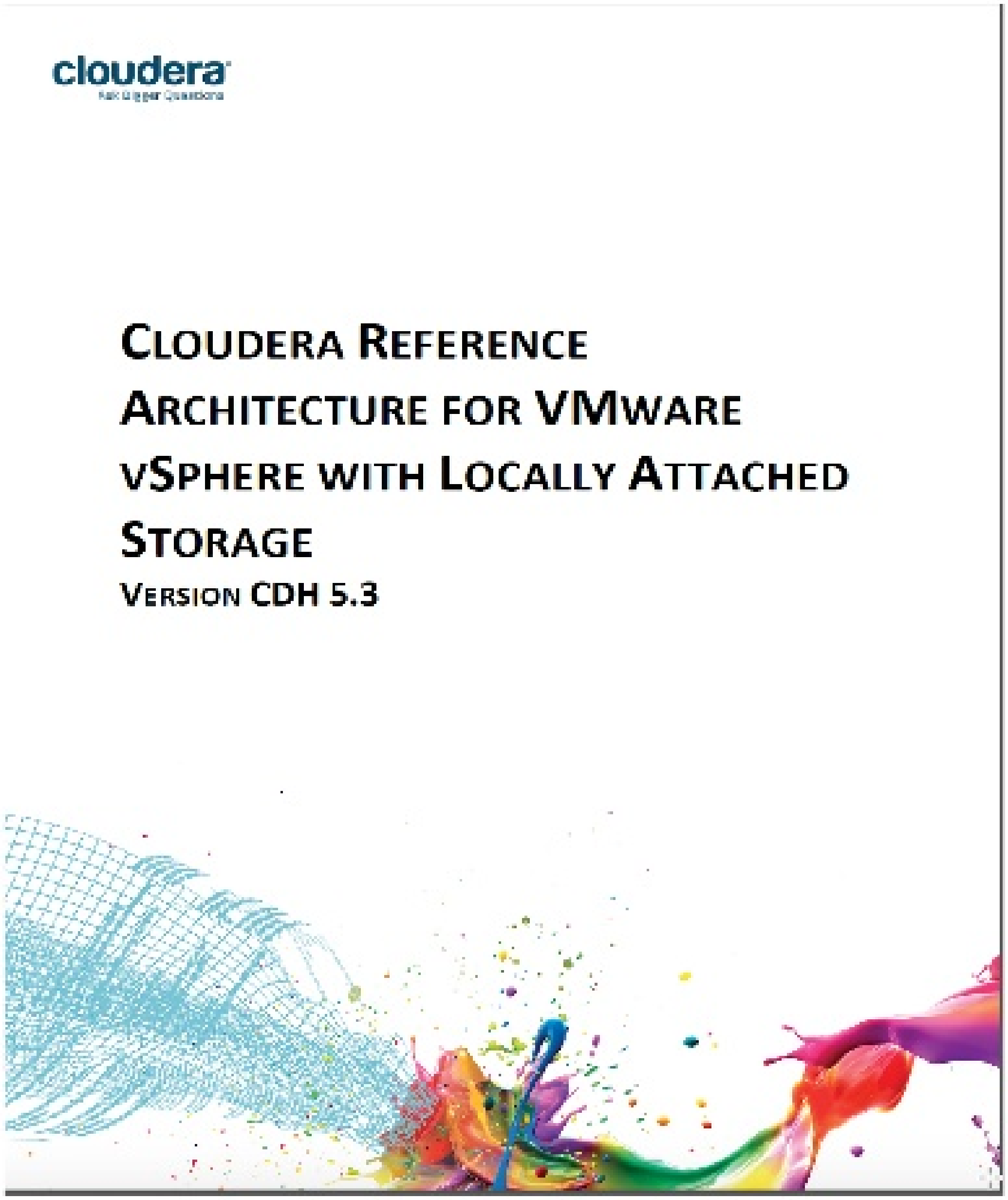
Reference Architectures

Combined Model: Two Virtual Machines on a Host



Six or More Local DAS disks per Virtual Machine

#1 Reference Architecture from Cloudera



cloudera

Ask Bigger Questions

Cloudera Reference Architecture for VMware vSphere with Locally Attached Storage

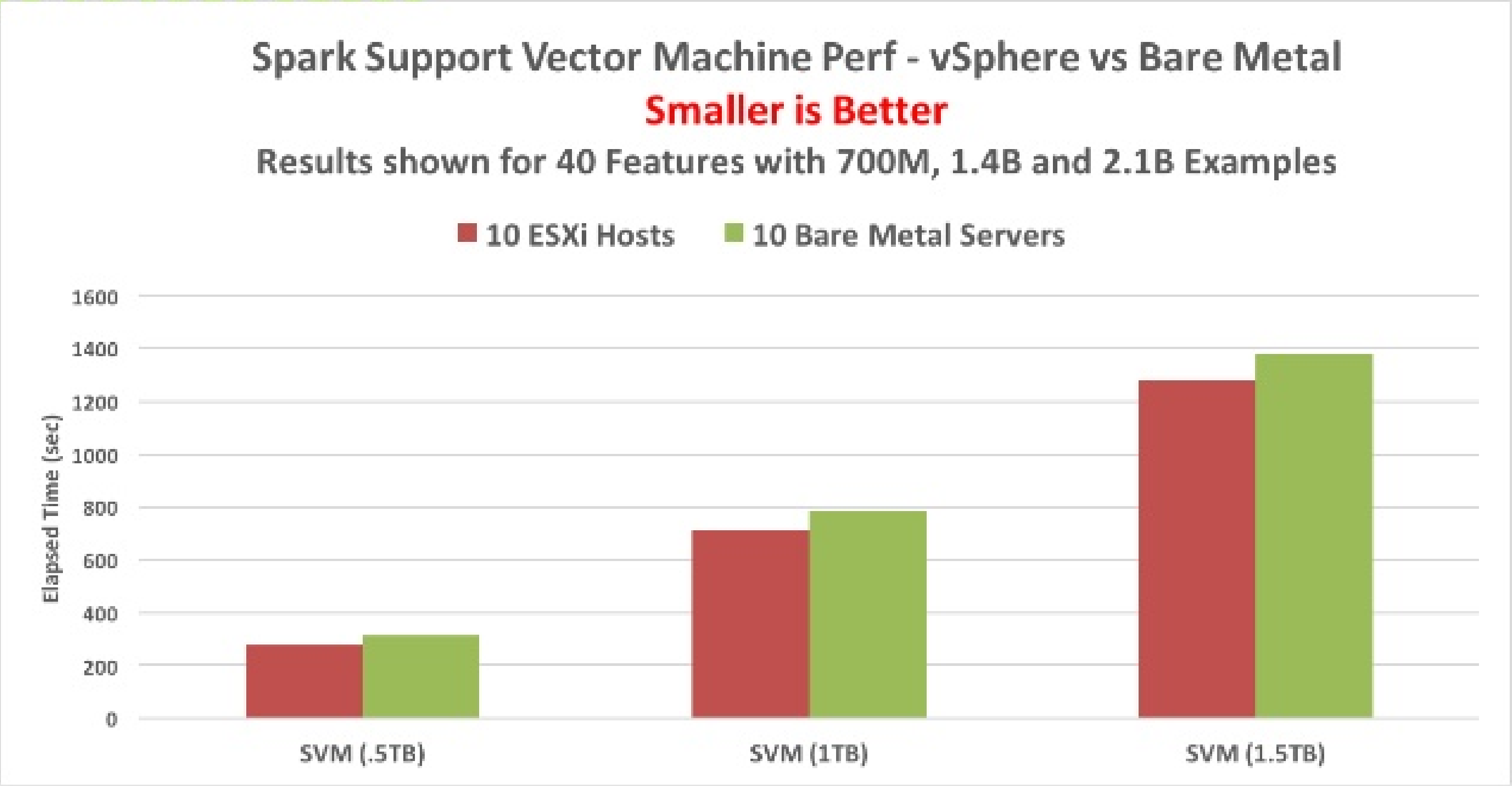
Version CDH 5.3

Performance

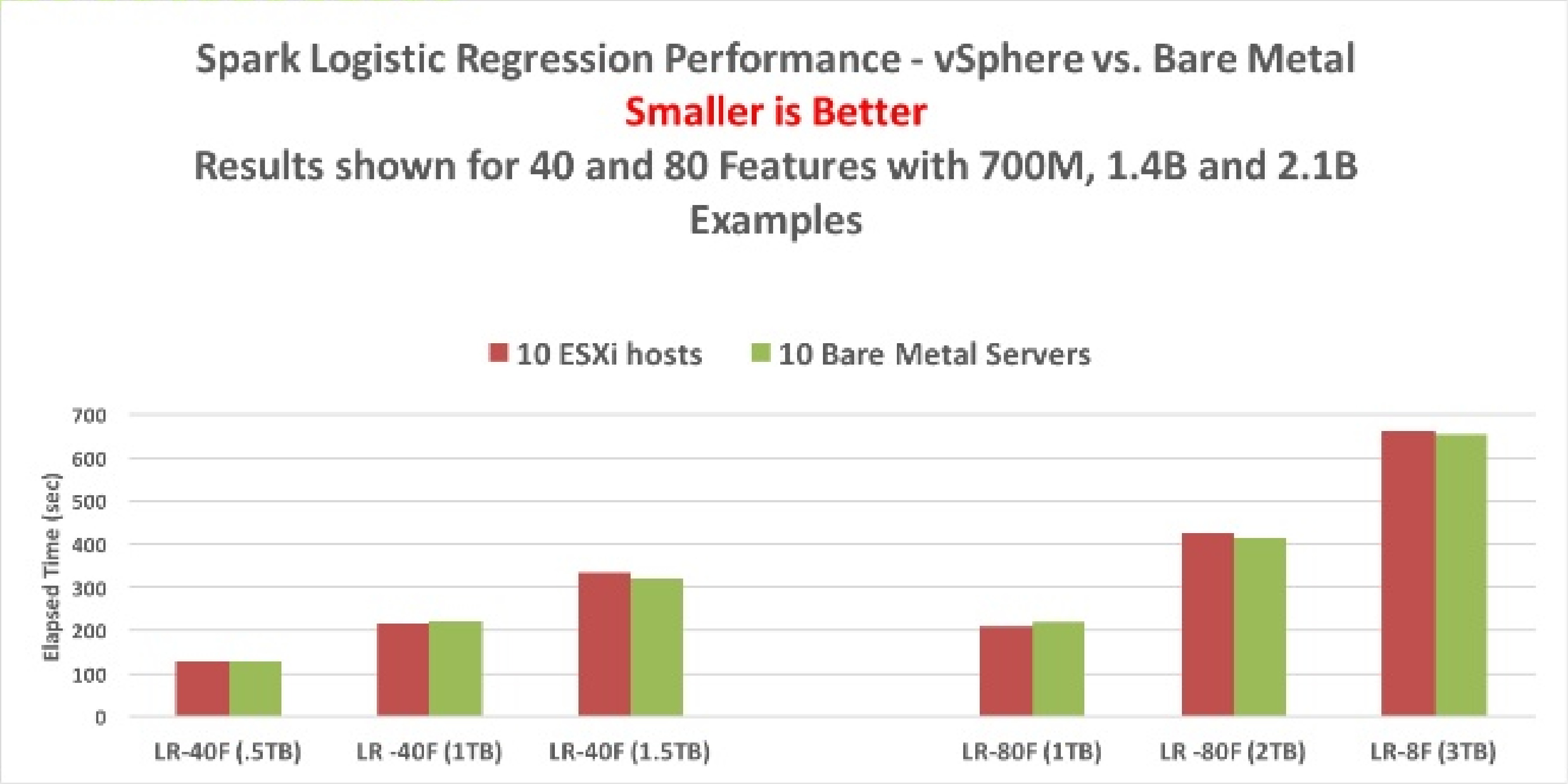
Workloads - Spark

- Two standard analytic programs from the Spark MLLib (Machine Learning Library)
- Driven using SparkBench (https://github.com/SparkTC/spark-bench)
  - Support Vector Machine
  - Logistic Regression

Spark Support Vector Machine Performance



Spark Logistic Regression Performance



Spark Logistic Regression Performance - vSphere vs. Bare Metal

Smaller is Better

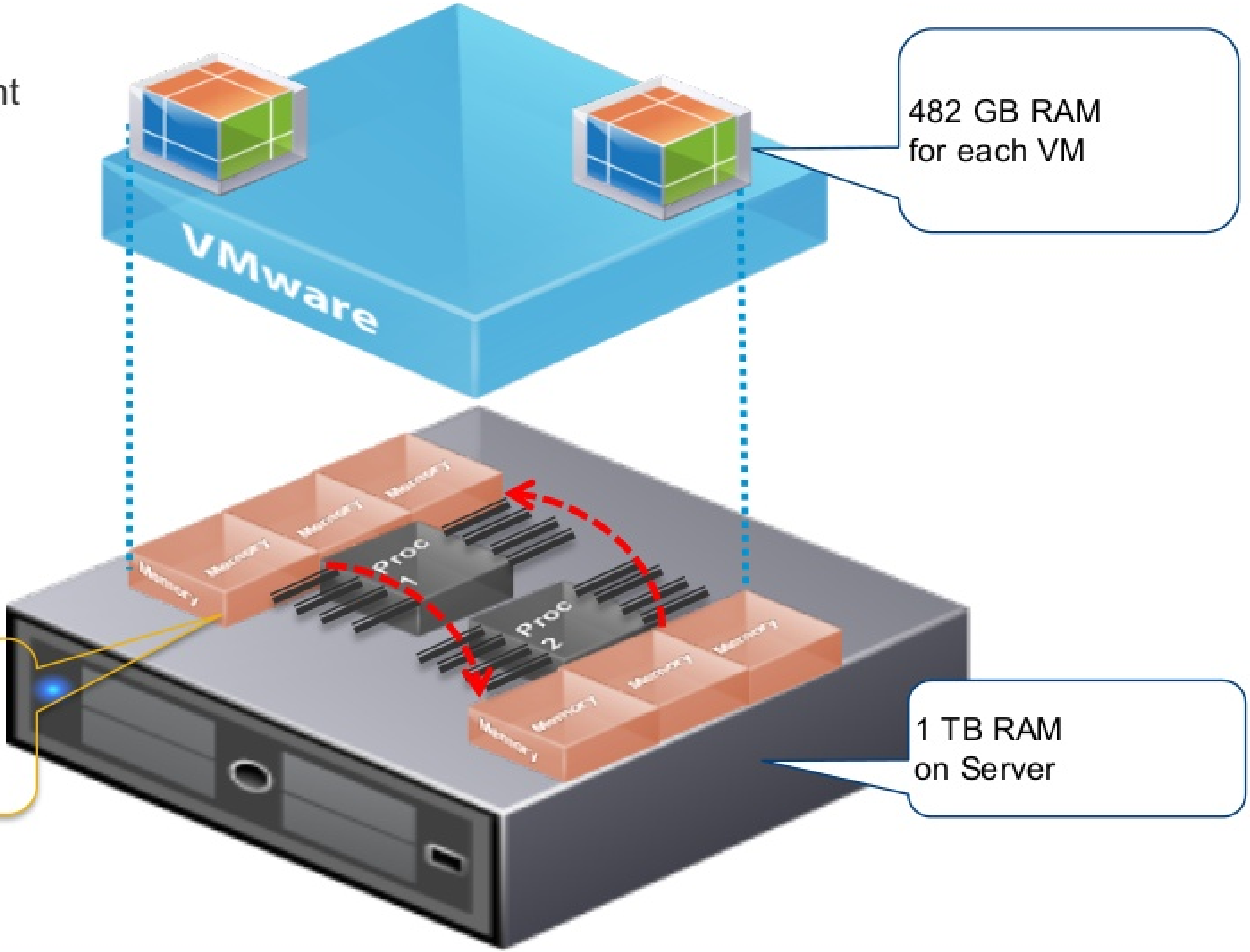
Results shown for 40 and 80 Features with 700M, 1.4B and 2.1B Examples

Results - Spark

- Support Vector Machines workload, which stayed in memory, ran about 10% faster in virtualized form than on bare metal
- Logistic Regression workload, which was written to disk at the larger dataset sizes, showed a slight advantage to bare metal
  - part of the dataset was cached to disk,
  - larger memory of the bare metal Spark executors may help

- Both workloads showed linear scaling from 5 to 10 hosts and as dataset size increased

NUMA and Virtual Machine Placement



482 GB RAM
for each VM

1 TB RAM
on Server

Conclusions

- Spark workloads work very well on VMware vSphere
  - Various performance studies have shown that any difference between virtualized performance and native performance is minimal
  - Follow the general best practice guidelines that VMware has published
  - Design patterns such as data-compute separation can be used to provide elasticity of your Spark cluster.

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Thank You.

Contact jmurray@vmware.com or bigdata@vmware.com

Add Slides as Necessary

- Supporting points go here.