

Communicating with the Elephant in the Data Center



Who am I?



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Outline

- The Players
- The EcoSystem
- The Cluster Nodes
- Getting Data in and out of the Cluster
- Analyst and Developer Tools
- Management and Monitoring
- Security Considerations

The Players



- Apache Hadoop



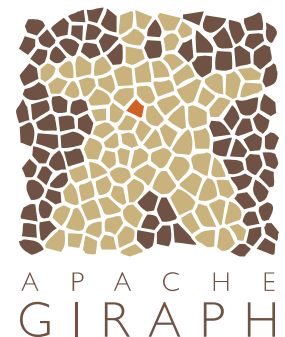
- Hadoop Ecosystem



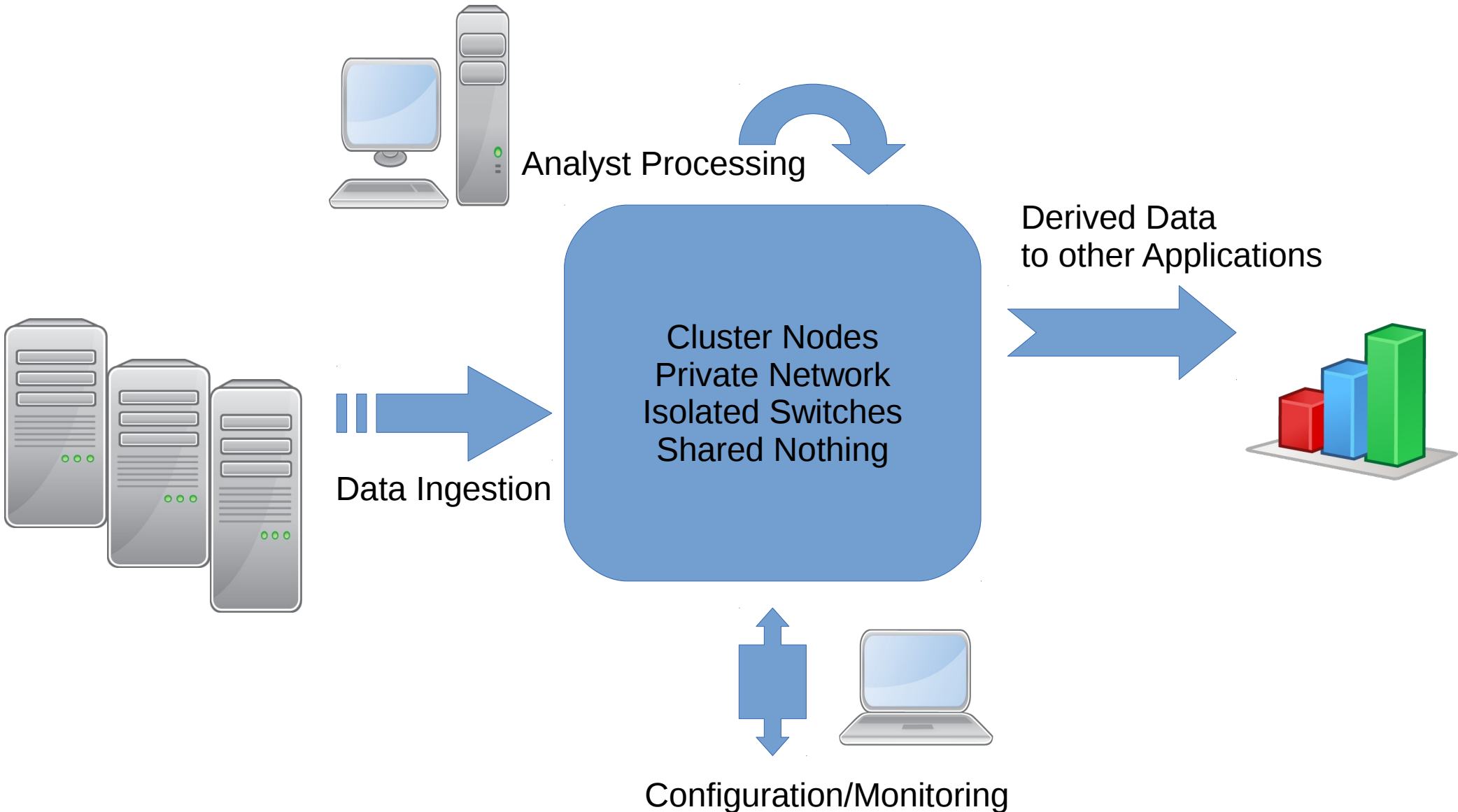
- Enterprise Distributions
 - Cloudera.com
 - Hortonworks.com
 - Mapr.com
 - Pivotal.io



Apache Ambari
<http://incubator.apache.org/ambari>



EcoSystem Categories



Cluster Nodes

- Masters

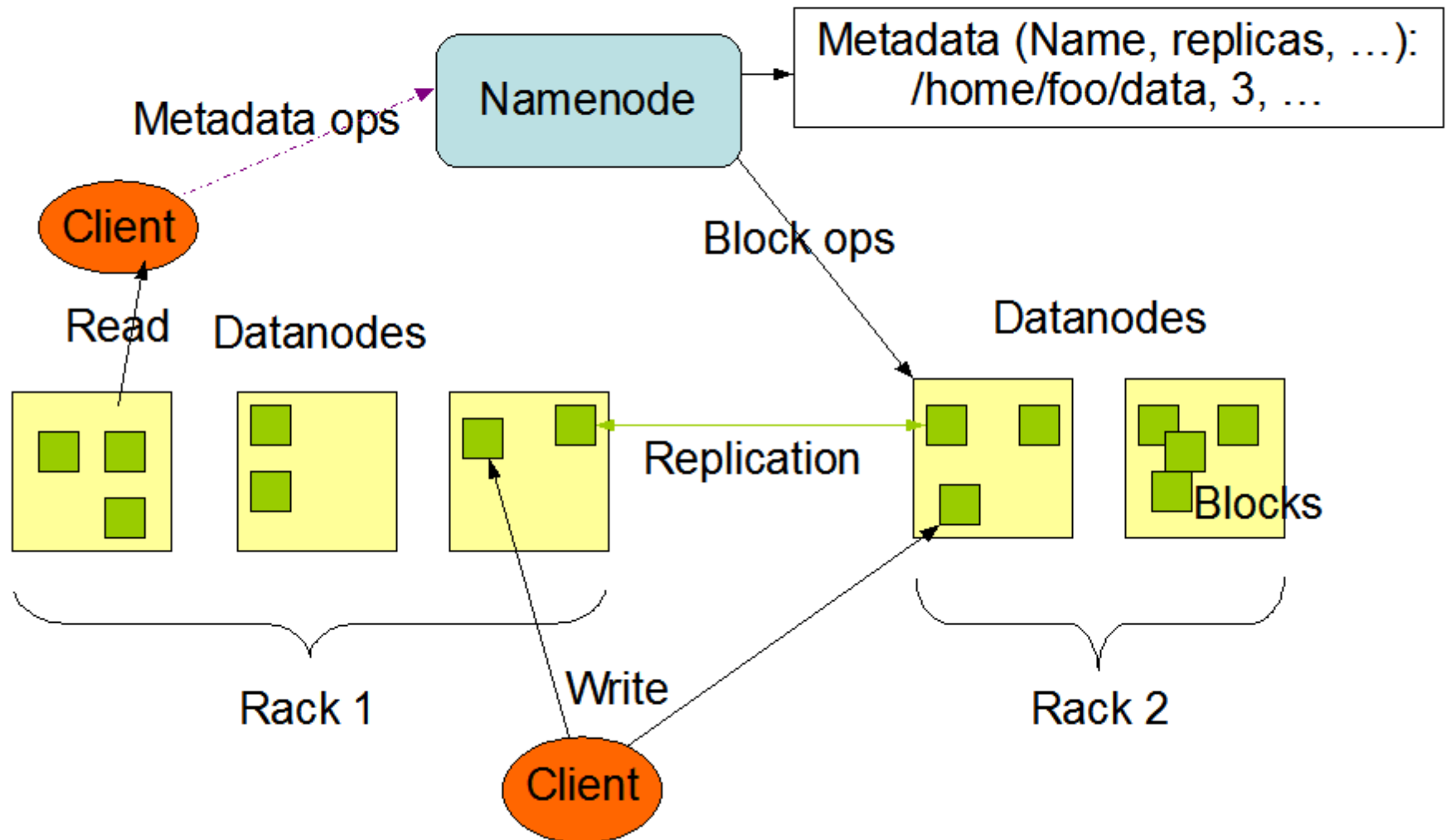
- NameNode (HDFS)
- ResourceManager (YARN)
- JobHistoryServer (MRv2)
- JournalNodes (HA)
- Zookeeper
- HMaster (HBASE)

- Slaves

- DataNode (HDFS)
- NodeManager (YARN)
- RegionServer (HBASE)
- Impala Server

HDFS

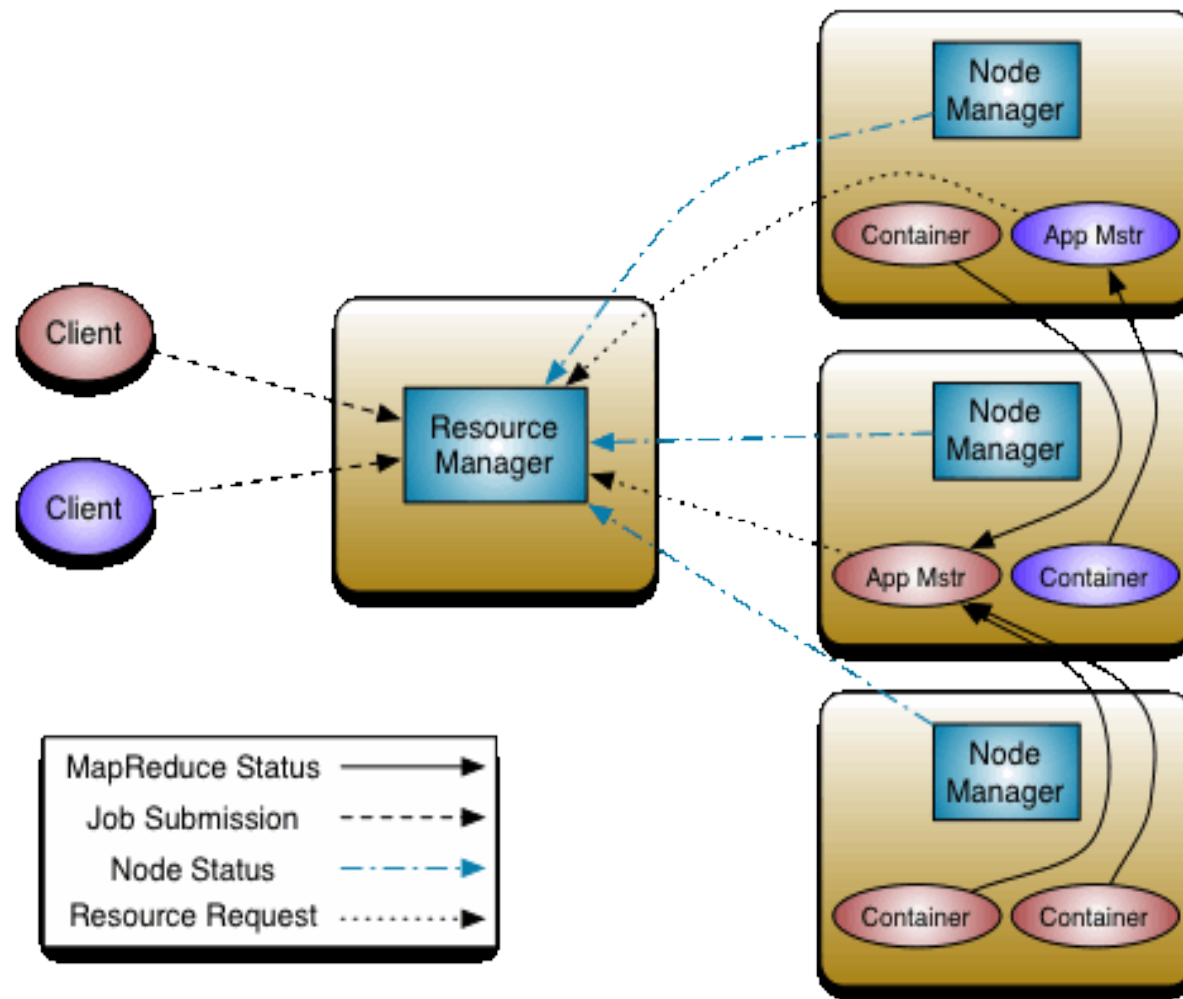
HDFS Architecture



Hadoop Distributed File System

- NameNode and DataNodes
- User space filesystem
- Distributed at a block level (128M default) and replicated
- Locality for processing
- Optional grouping with rack awareness
- *nix style permissions (plus new ACLs)
- NN High Availability options

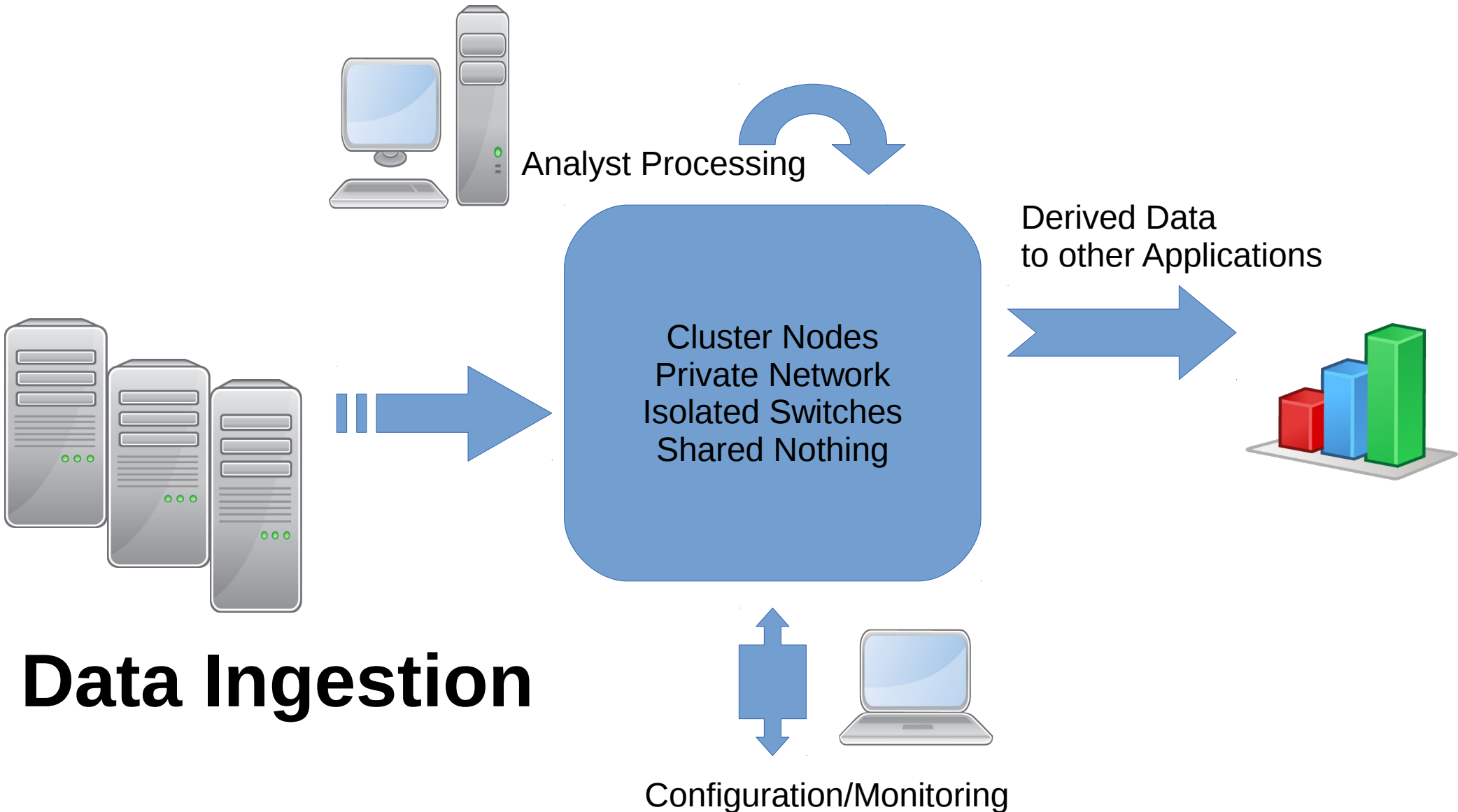
YARN



Yet Another Resource Manager

- Resource Manager and NodeManager
- Application Master and task containers
- Schedulers (Fair, Capacity, FIFO)
 - Queue management, SLAs, ACLs
- Many processing types
 - MapReduce v2, Spark, Giraph, Impala
- <2014 used MRv1 (Classic MapReduce)
 - JobTracker and TaskTracker
 - Only MapReduce processing type

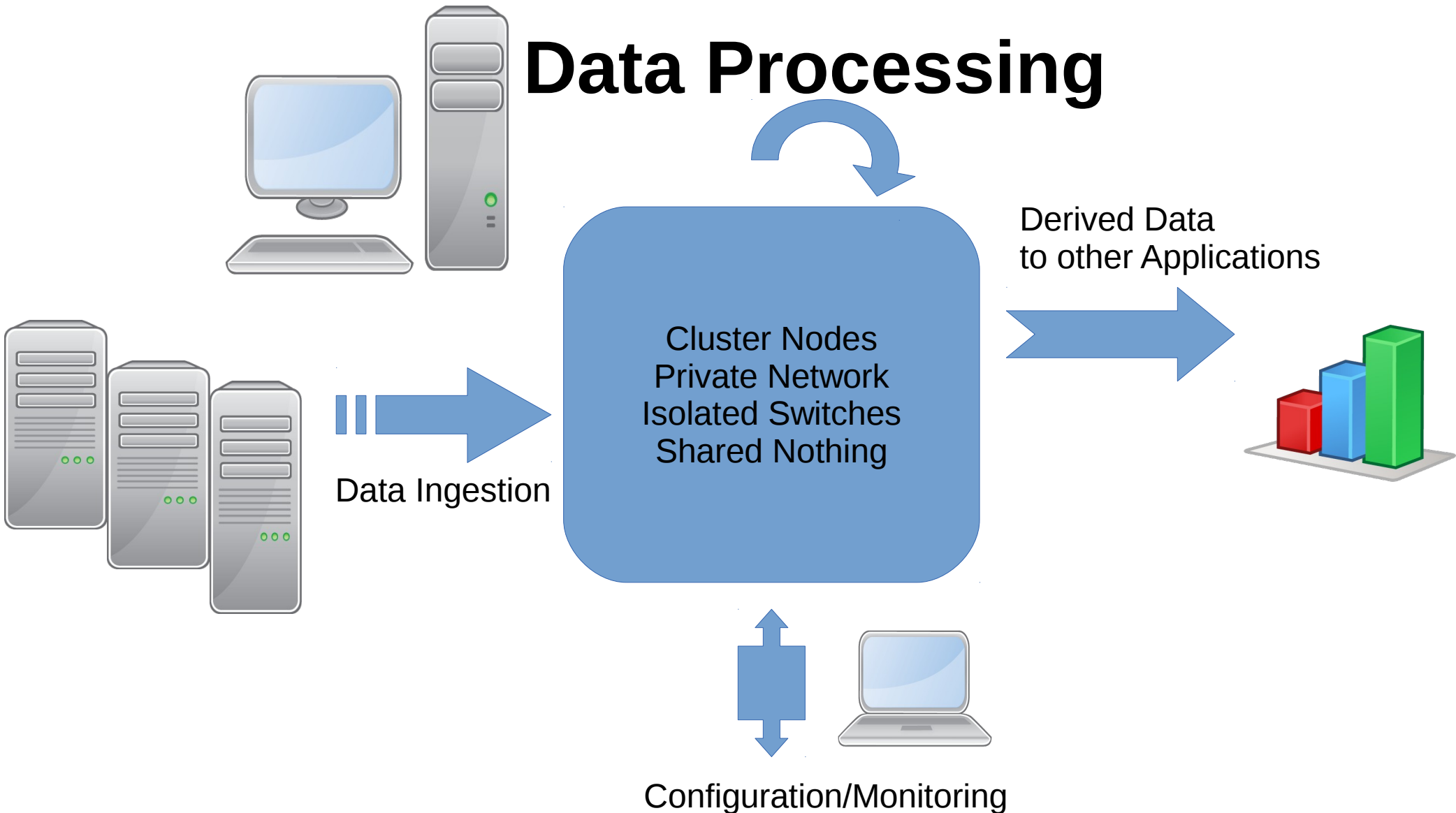
EcoSystem Categories



Data Ingestion

- Event driven (Flume, Kafka)
- Batch process (Sqoop)
- REST API (WebHDFS, HttpFS)
- Data formats (text, sequence, JSON, avro, parquet, etc)
- Securing Data
 - File Permissions
 - Multiple Clusters
 - Preprocessing (cleansing)
 - Backup, Disaster Recovery considerations

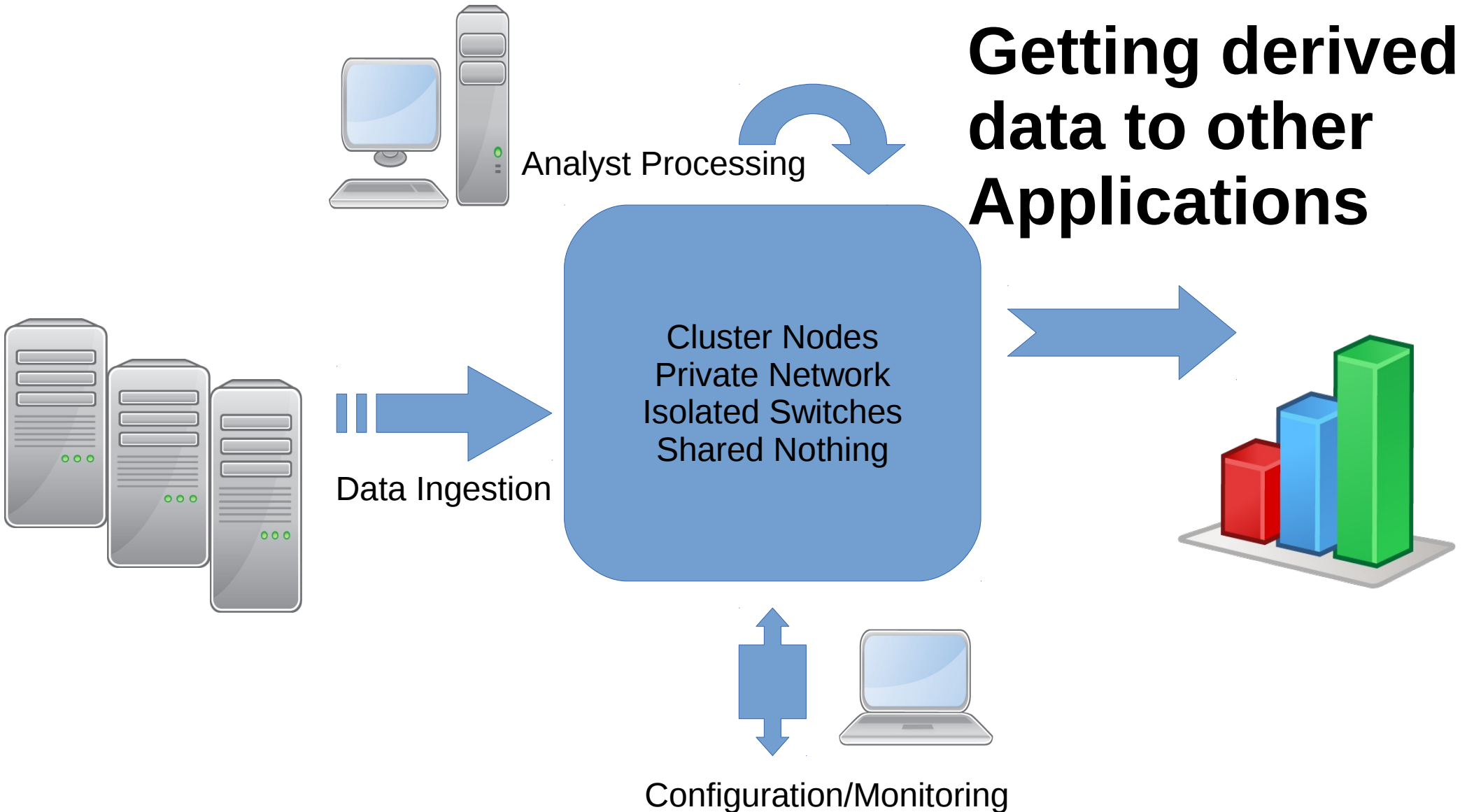
EcoSystem Categories



Analyst and Developers

- Staging, cleansing
- Multiple stages (Oozie)
- Java, Hive, Pig (MapReduce)
- Scala, Python, Hive, Pig (Spark)
- Big Table (Hbase, Accumulo)
- Short Ad-hoc Queries (Impala, Tez)
- Machine Learning (Mahout)

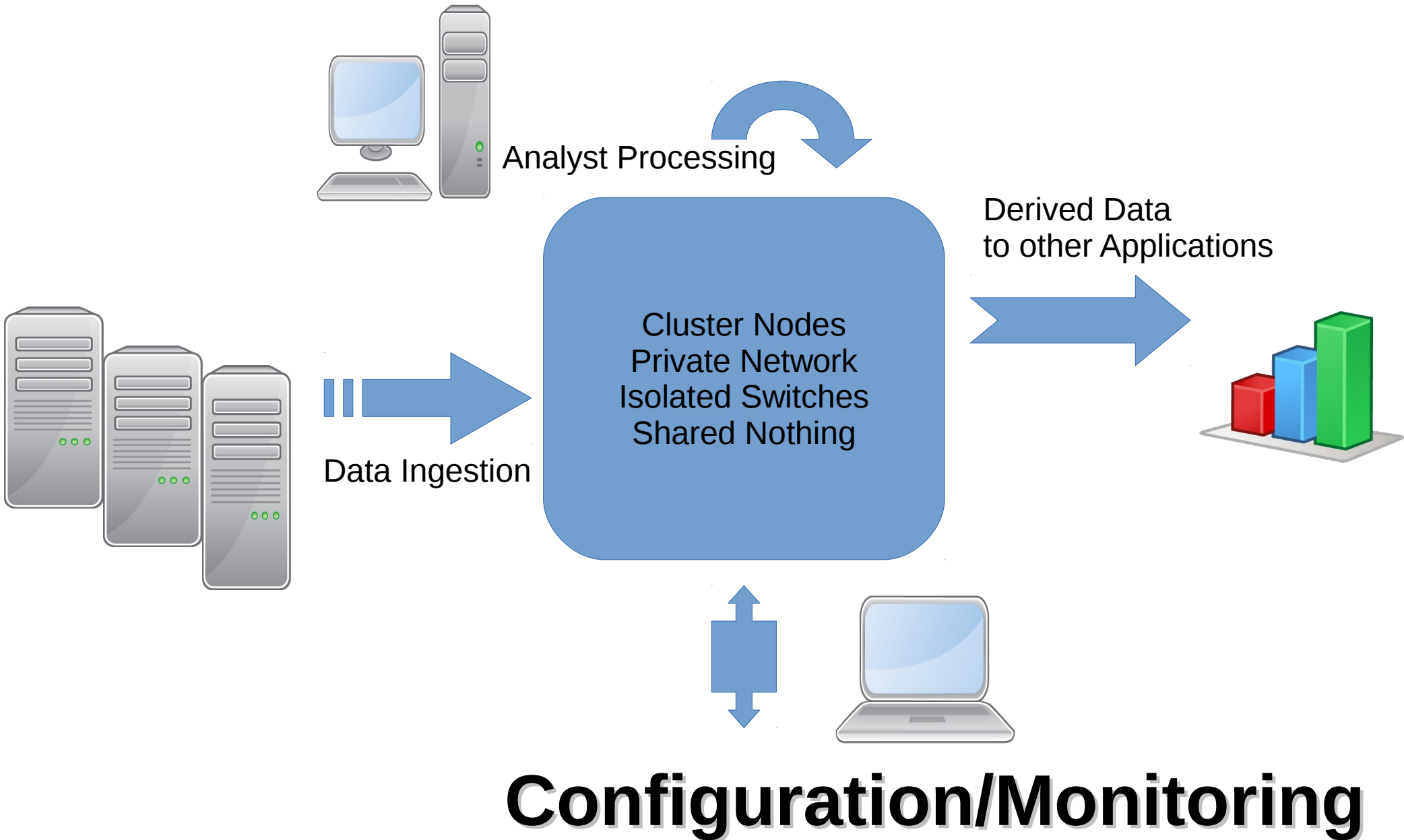
EcoSystem Categories



Getting Data Out...

- To a RDBMS (Sqoop)
- To tools with ODBC drivers (Hive, Impala)
- REST API
- NFS Gateway for HDFS
- Cluster to cluster (distcp)

EcoSystem Categories

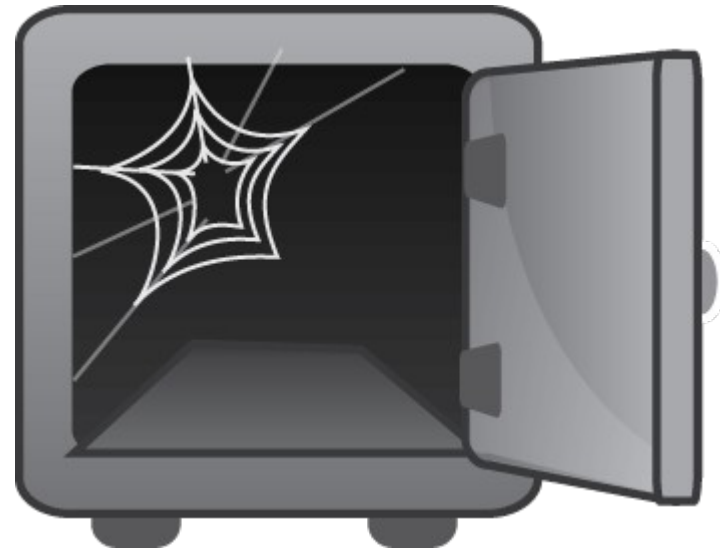


Management/Monitoring

- Ambari, Cloudera Manager
- Puppet, Chef, Ansible, etc
- Ganglia
- JMX broadcasts (Nagios, Catci, Zabbix, etc)
- Logs are everywhere
- DNS, NTP, Kerberos

Security

- Isolate the cluster. All access or none.
- *nix like permissions with ACLs
- Strong authentication with Kerberos
- Role based access
 - Sentry for Hive or Impala
- Encryption on the wire
 - WebUI, shuffle/sort, data transfer
- Encryption on the disk
 - Coming soon. Gazzang, Rhino, HDFS 2.5



Slides available at:
<http://github.com/laubersm/LauberSolutions>

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