Big Data

Spark YARN

Spark YARN

❖ Spark YARN Characteristics

- Spark is compatible with Hadoop by using YARN to run Hadoop clusters
- Spark can process data on any Hadoop input format
  - HDFS, HBase, Cassandra, Hive, etc.

Spark YARN

❖ Spark YARN Client Mode Example

1. Driver (Scalar or Python shell) program for the Application runs on the Client's computer (PC or Laptop)
2. YRM (YARN Resource Manager) selects a node (with sufficient resources) and makes a request to the node's YNM (YARN Node Manager) to setup a YAM (YARN App Master)
   - YRM's Apps Master starts to monitor the YAM

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❖ Spark YARN Client Mode Example

3. YAM makes a request to the YRM to have multiple YCs (YARN Containers) with Executors to be setup in the cluster
4. YRM informs the YAM which nodes have sufficient resources to setup YCs and sends the required information to the YAM to enable the setup process

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❖ Spark YARN Client Mode Example

5. YAM makes a request to the YNMs to setup YCs on the nodes
6. Inside each YC has an Executor is setup to process Tasks on the RDD partitions

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❖ Spark YARN Client Mode Example

7. Client can use the Driver to be directly interactive with the Executors in the YCs on the nodes
   - Client can check the results of the Transforms/Actions in the Executors in real-time using the Driver interface

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❖ Spark YARN Client Mode Example

8. Two Level Scheduler Control operations

- YRM Scheduler decides which nodes will have Containers to run the Executor JVMs
- Driver Scheduler decides the actual Task that will run on each Executors
  - Driver Scheduler attempts to optimize the Task assignment based on the Cached RDD dataset (e.g., HDFS Blocks) stored on each node

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❖ Spark YARN Client Mode Example

9. Spark YARN Client mode process will End when a Driver program is closed

- Client's Driver shell is terminated
- Client's computer (PC or Laptop) is turned off or moves away

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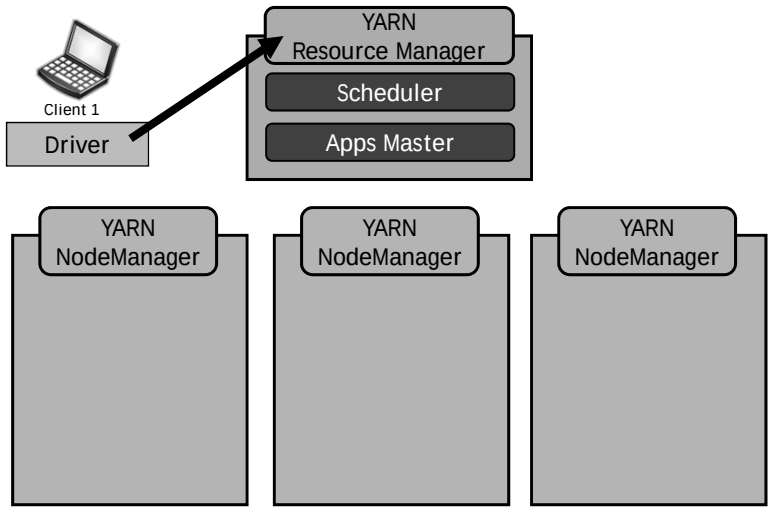
❖ Spark YARN Client Mode Example



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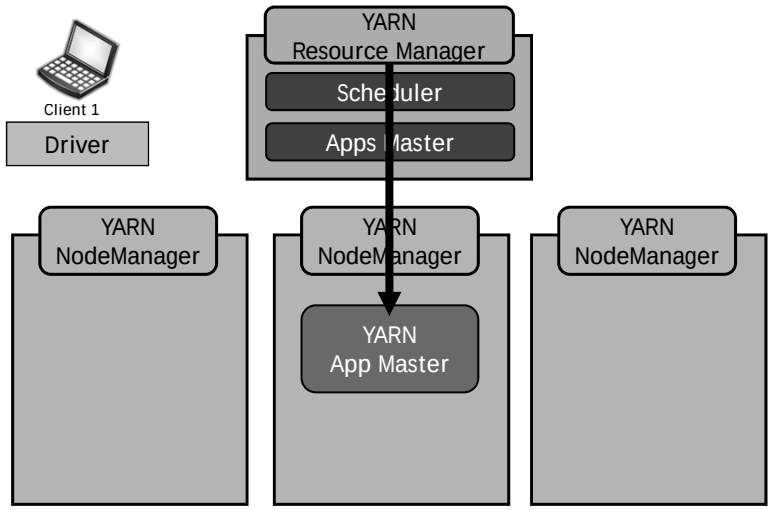
❖ Spark YARN Client Mode Example



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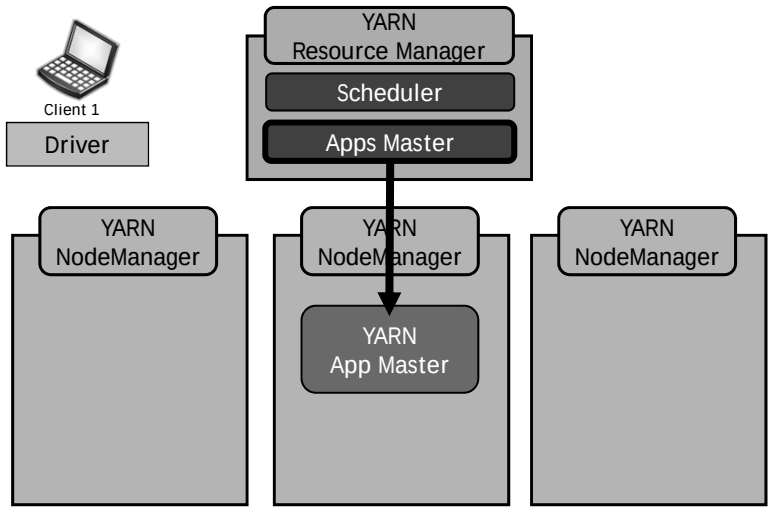

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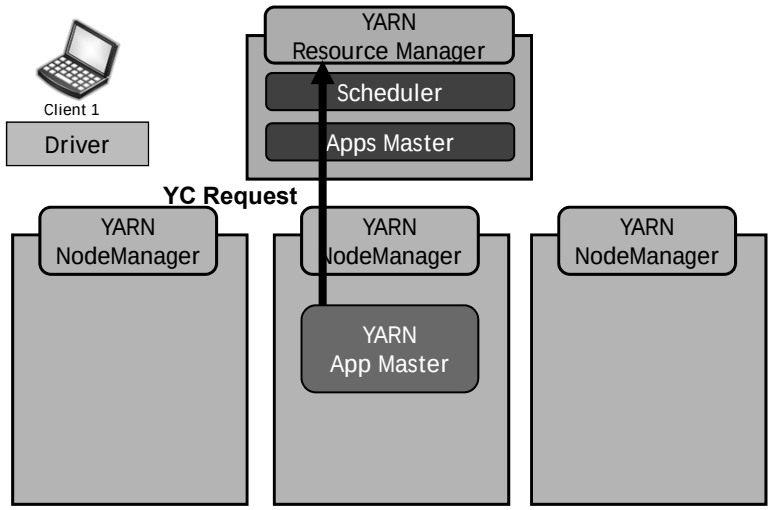

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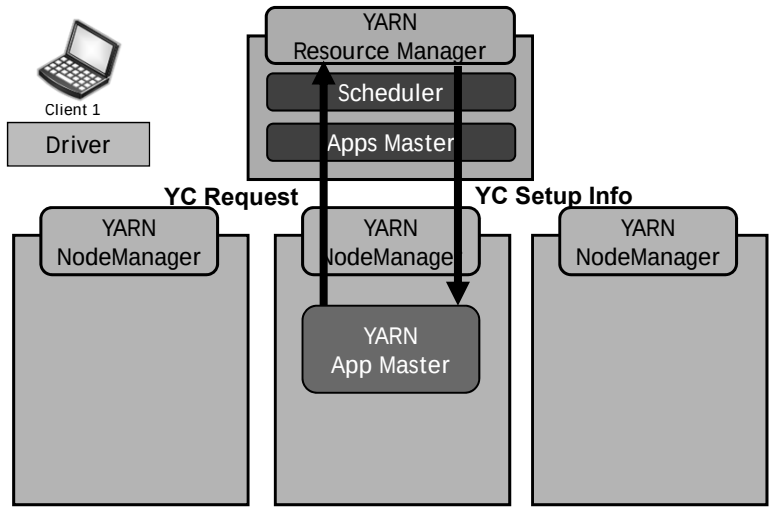

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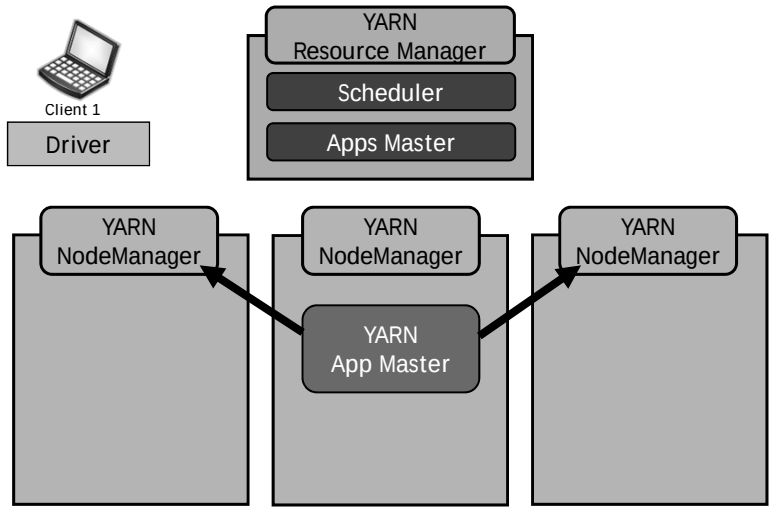

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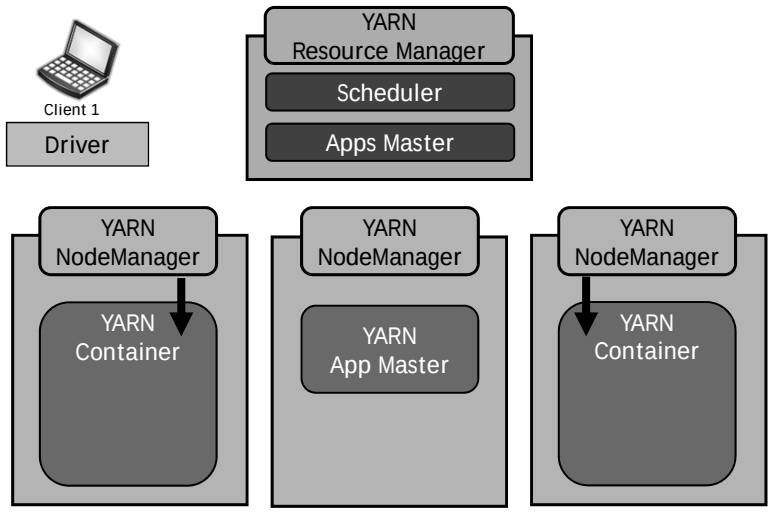

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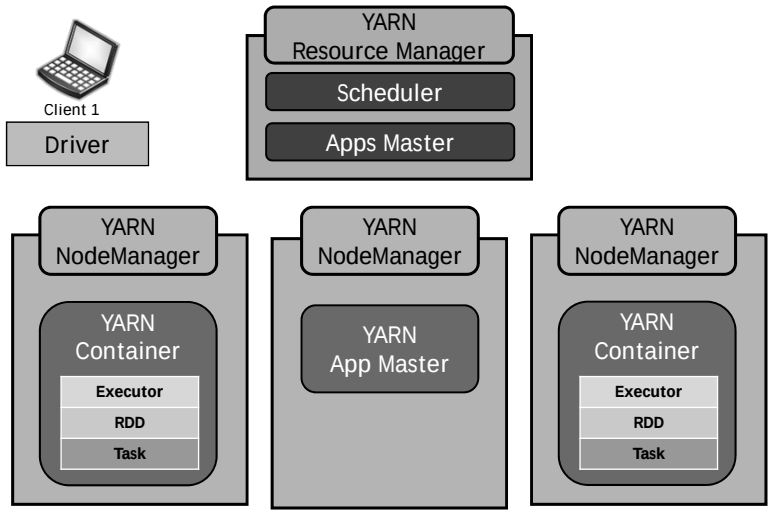

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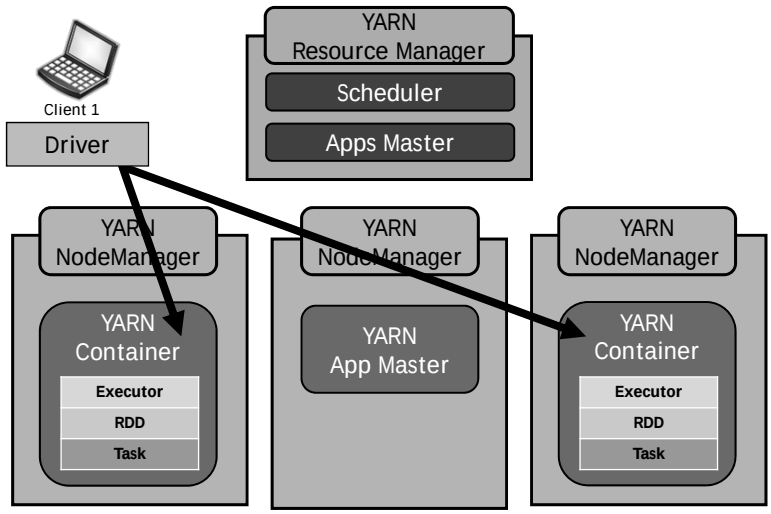

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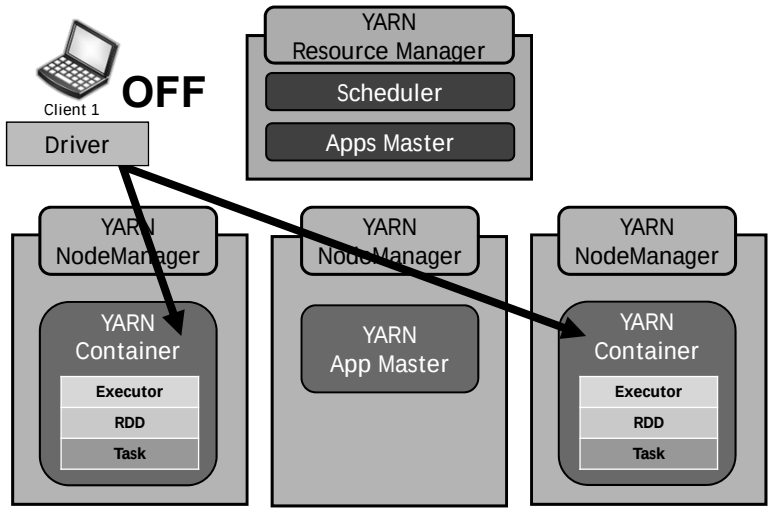

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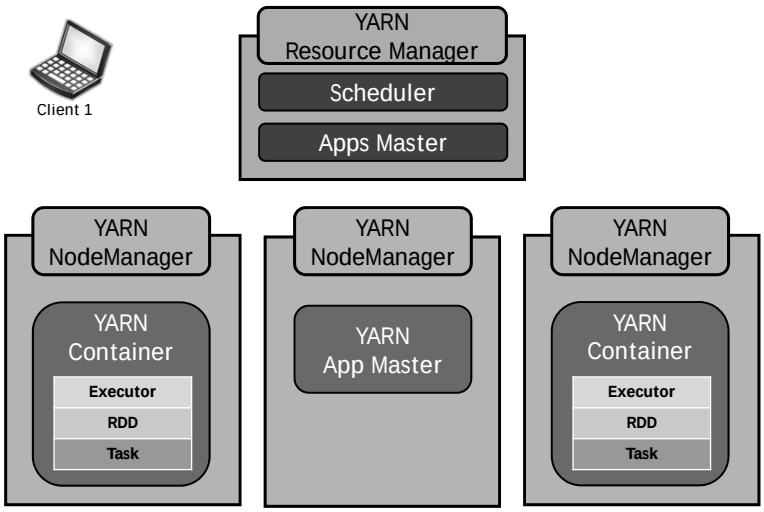

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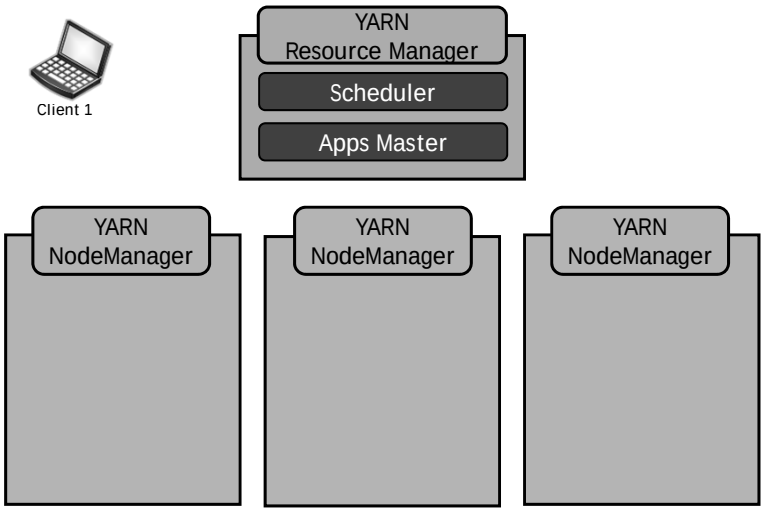


Spark YARN

❖ Spark YARN Cluster Mode Example

1. Client submits the App and the driver (e.g., Python script, JAR file) program to the cluster's RM
2. RM decides the location of the YAM (YARN App Master)
   - YRM's Apps Master starts to monitor the YAM
3. YAM starts to execute the Driver program internally

Spark YARN

❖ Spark YARN Cluster Mode Example

4. YAM makes a request to the RM to have multiple Containers (with Executors) to be setup in the cluster
5. RM informs the YAM which nodes have sufficient resources to setup Containers and sends the required information to the YAM to enable the setup process

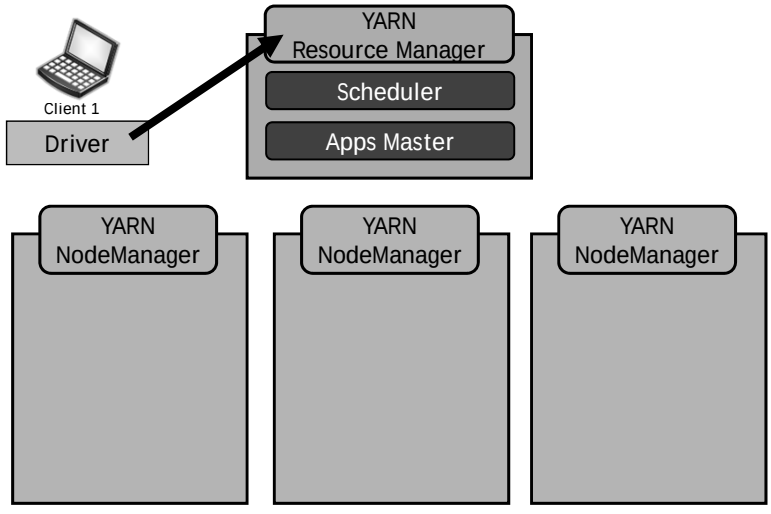
Spark YARN

❖ Spark YARN Cluster Mode Example

6. YAM makes a request to the NMs to setup Containers on their nodes
7. Inside each Container an Executor is setup to execute Tasks on the RDD partitions
8. The result (DAG's final RDD dataset) is saved to HDFS
9. Client can later check the results saved in the HDFS

Spark YARN

❖ Spark YARN Cluster Mode Example



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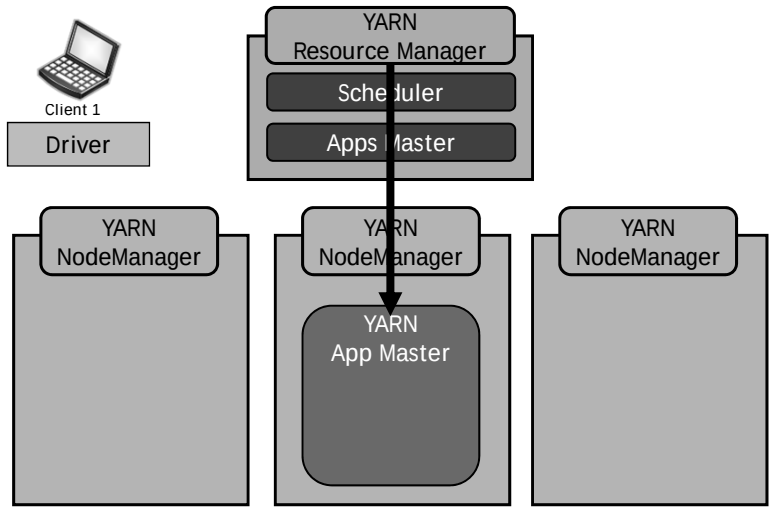

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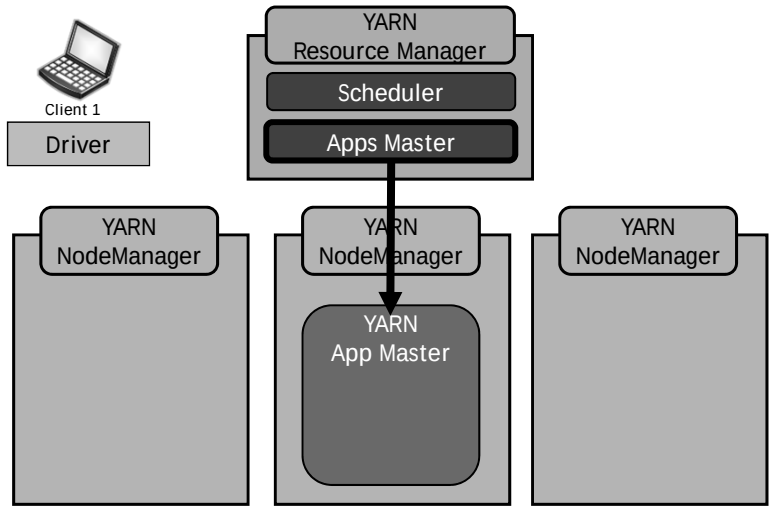

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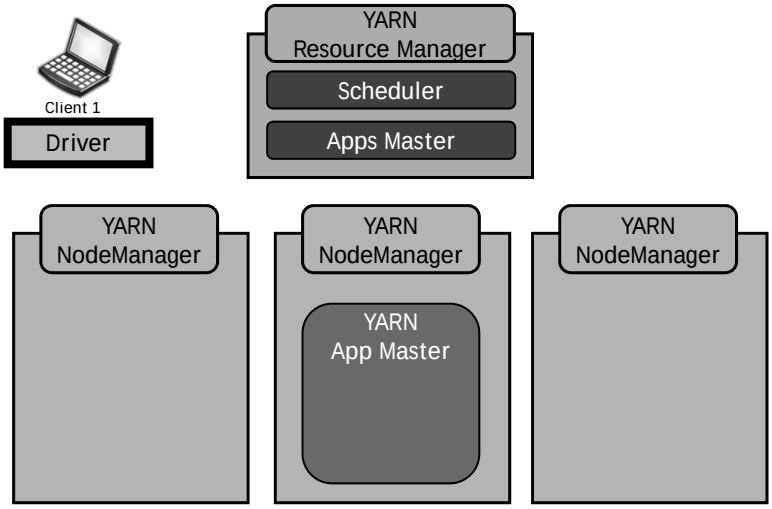

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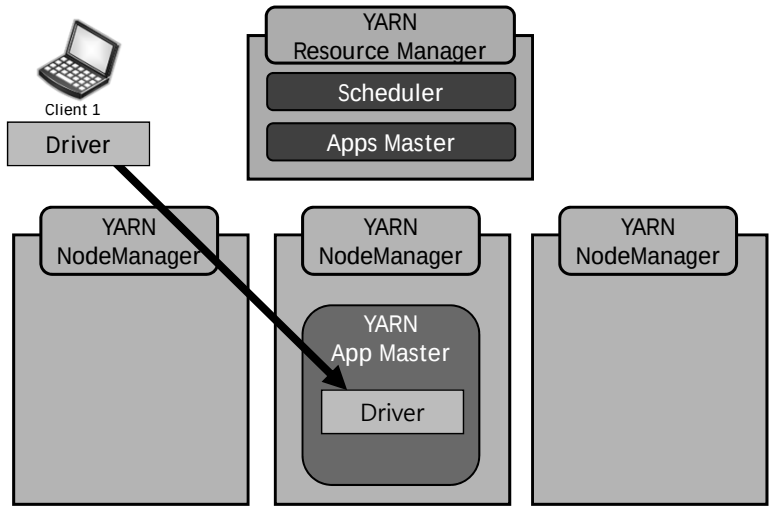

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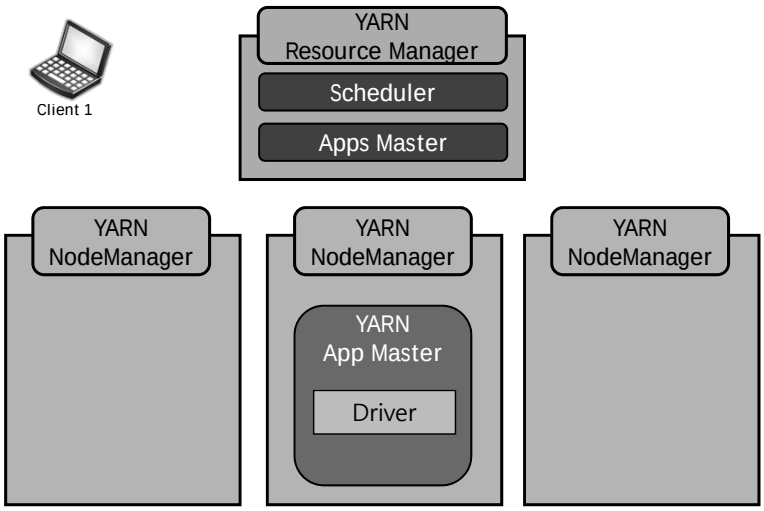

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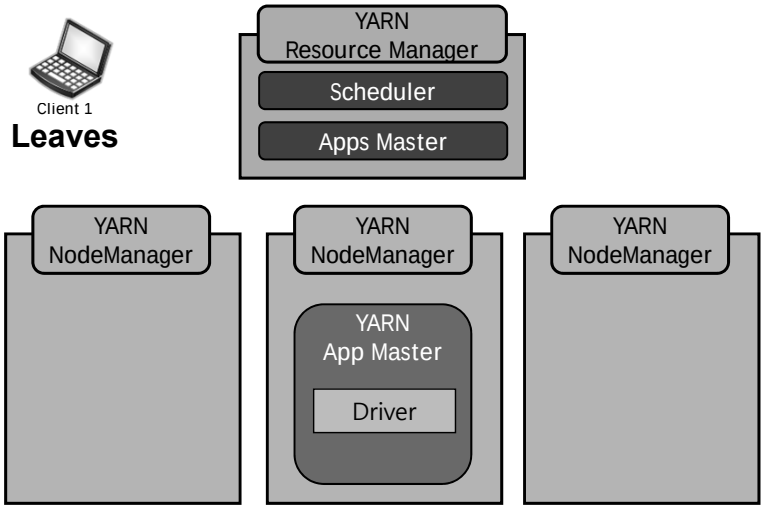

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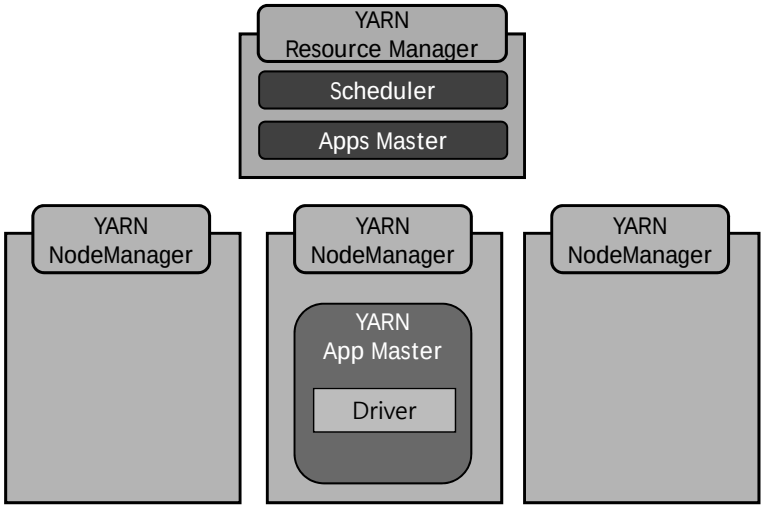

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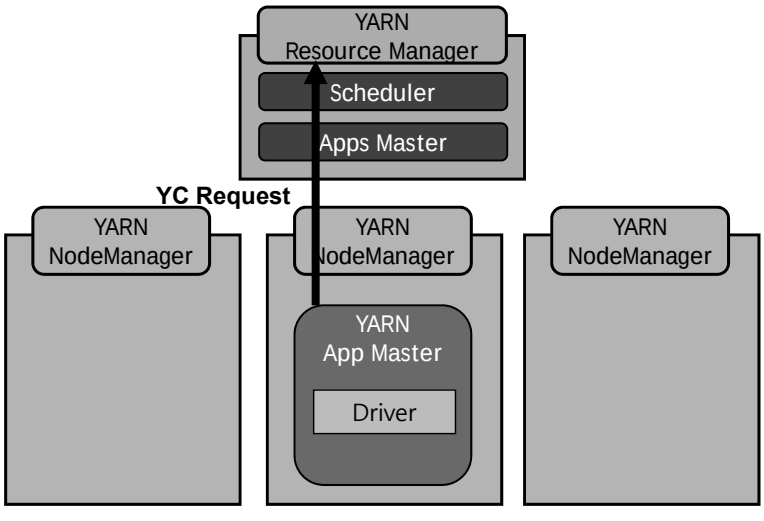

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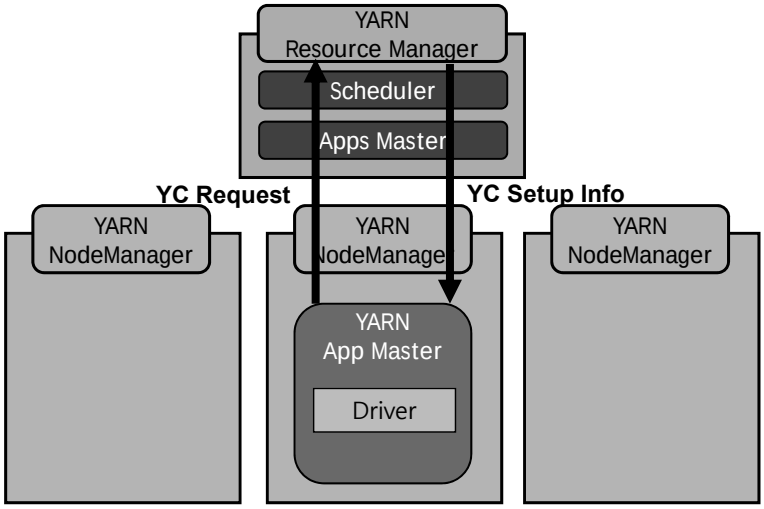

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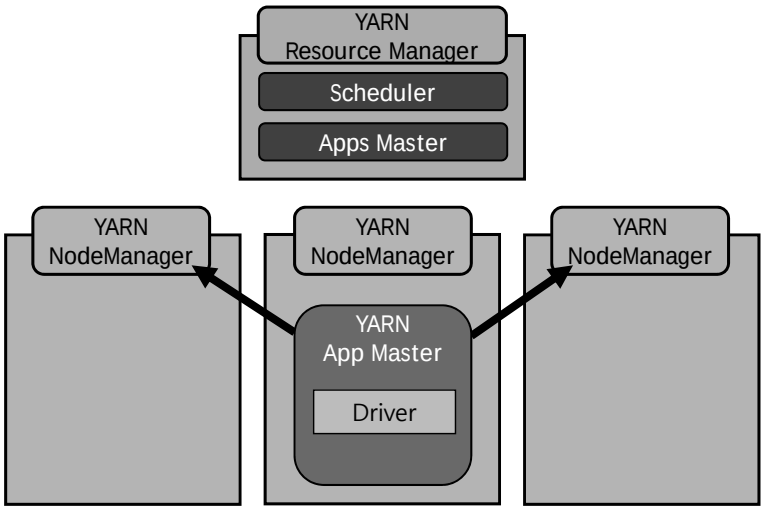

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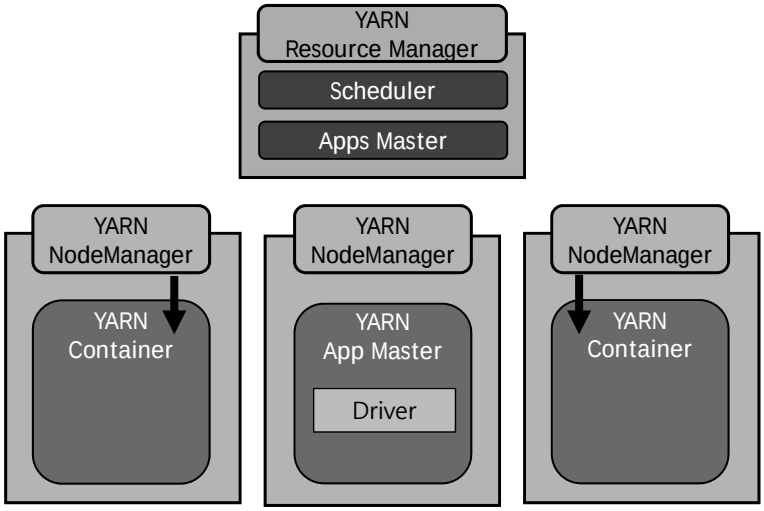

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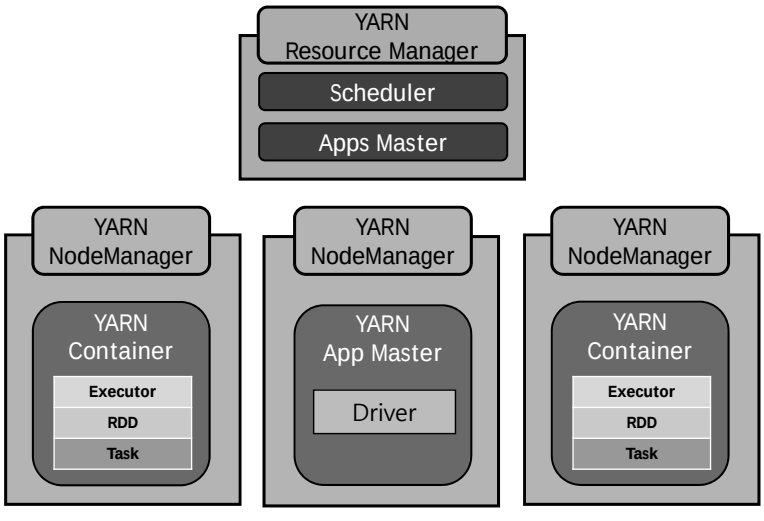

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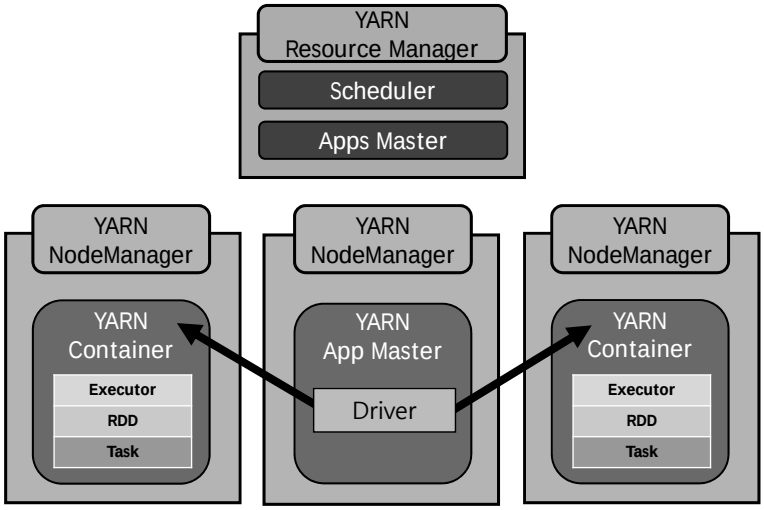

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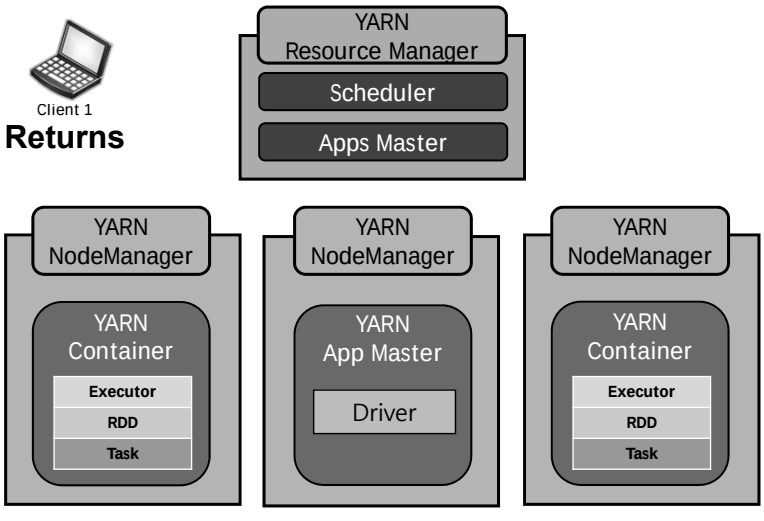

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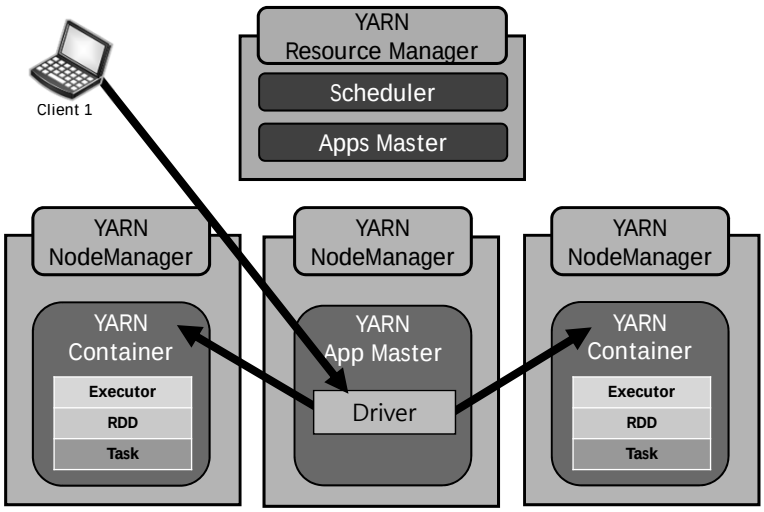

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References

References

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  - http://spark.apache.org/docs/latest/rdd-programming-guide.html
  - http://spark.apache.org/docs/latest/rdd-programming-guide.html#working-with-key-value-pairs
  - https://spark.apache.org/docs/2.2.0/rdd-programming-guide.html#rdd-persistence
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