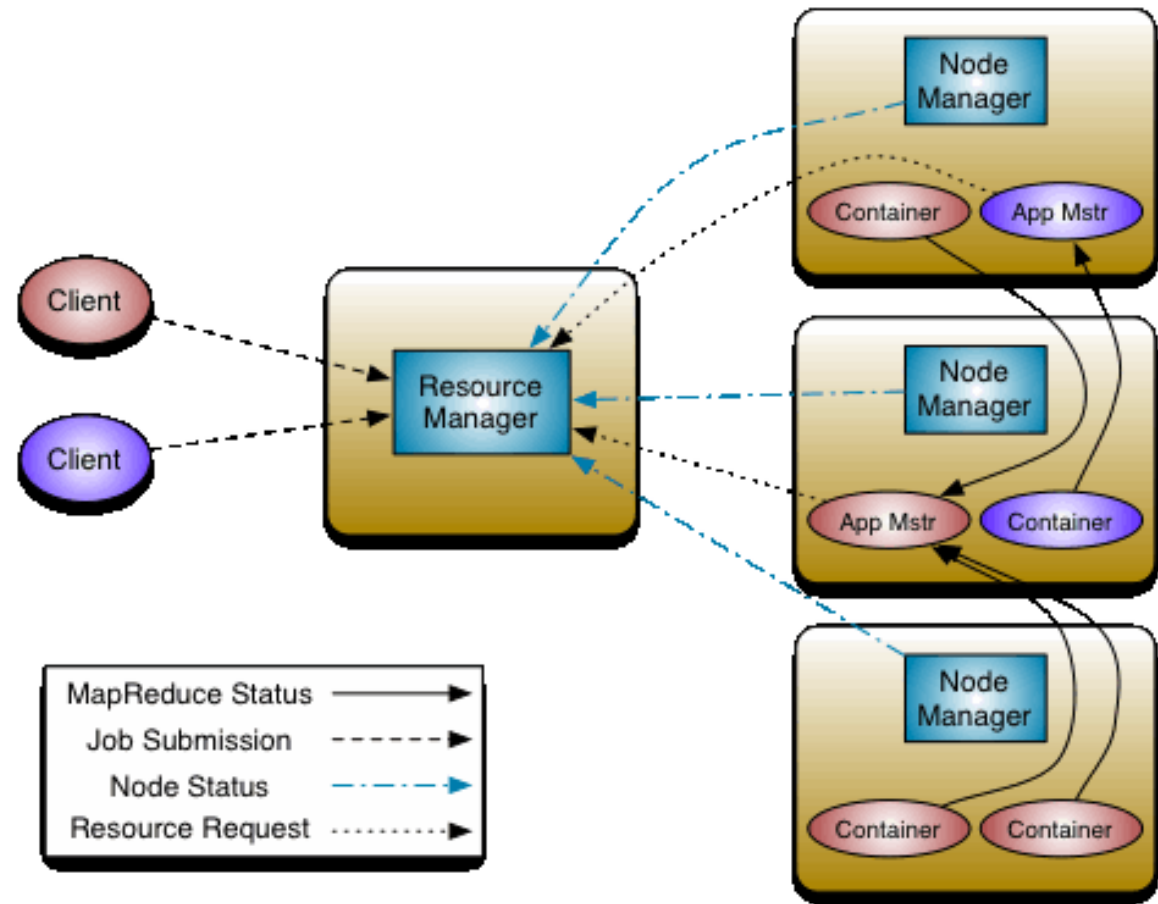# CLOUD COMPUTING APPLICATIONS

YARN, MESOS

Roy Campbell & Reza Farivar

Overview

- Mesos was built to be a scalable global resource manager for the entire data center (Berkeley 2007)
  - Hadoop, MPI,

- YARN was created out of the necessity to scale Hadoop.
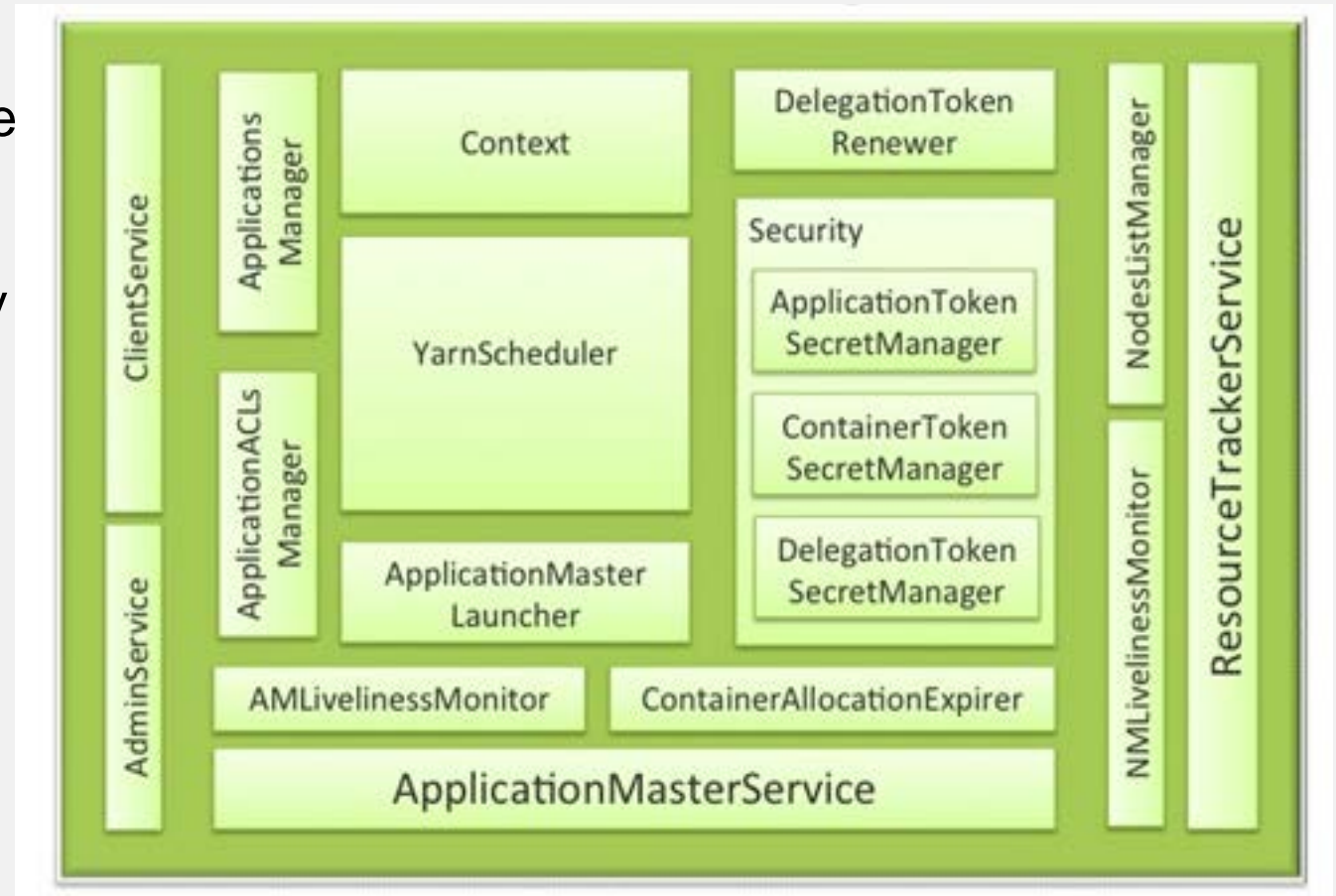
YARN ResourceManager

- Scheduler
  - pluggable policy partitions cluster resources among the various queues, and applications
  - CapacityScheduler and the FairScheduler
- NodeManagers take instructions from the ResourceManager and manage resources available on a single node.
- ApplicationsManager negotiates resources with the resourcemanager and for working with the nodemanagers to start the containers.
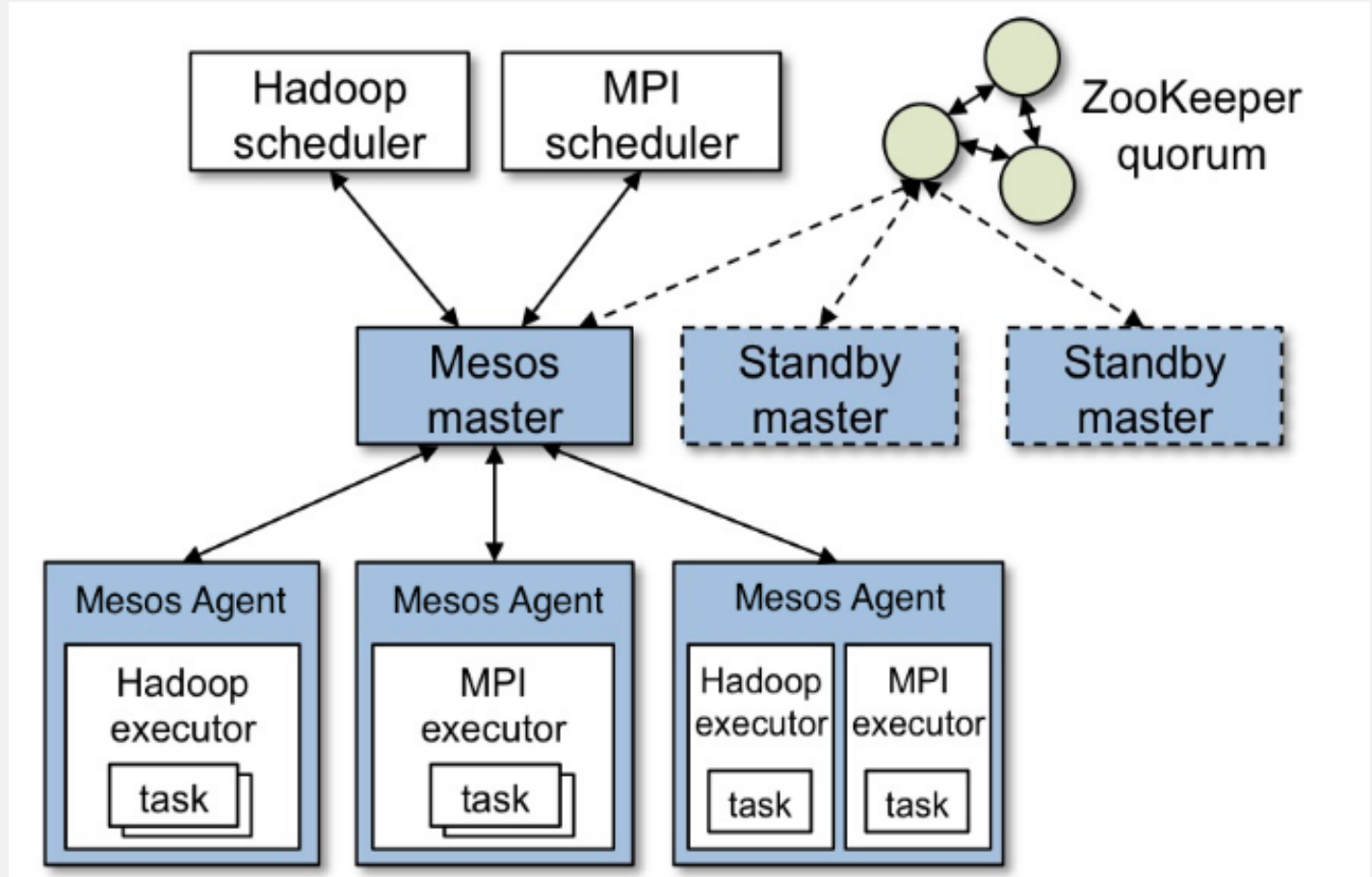- Compatible API with Map/Reduce

Insides of Yarn

- ResourceTrackerService
  - responds to RPCs from all the nodes.
  - Registration of new nodes, rejection of requests from any invalid/decommissioned nodes,
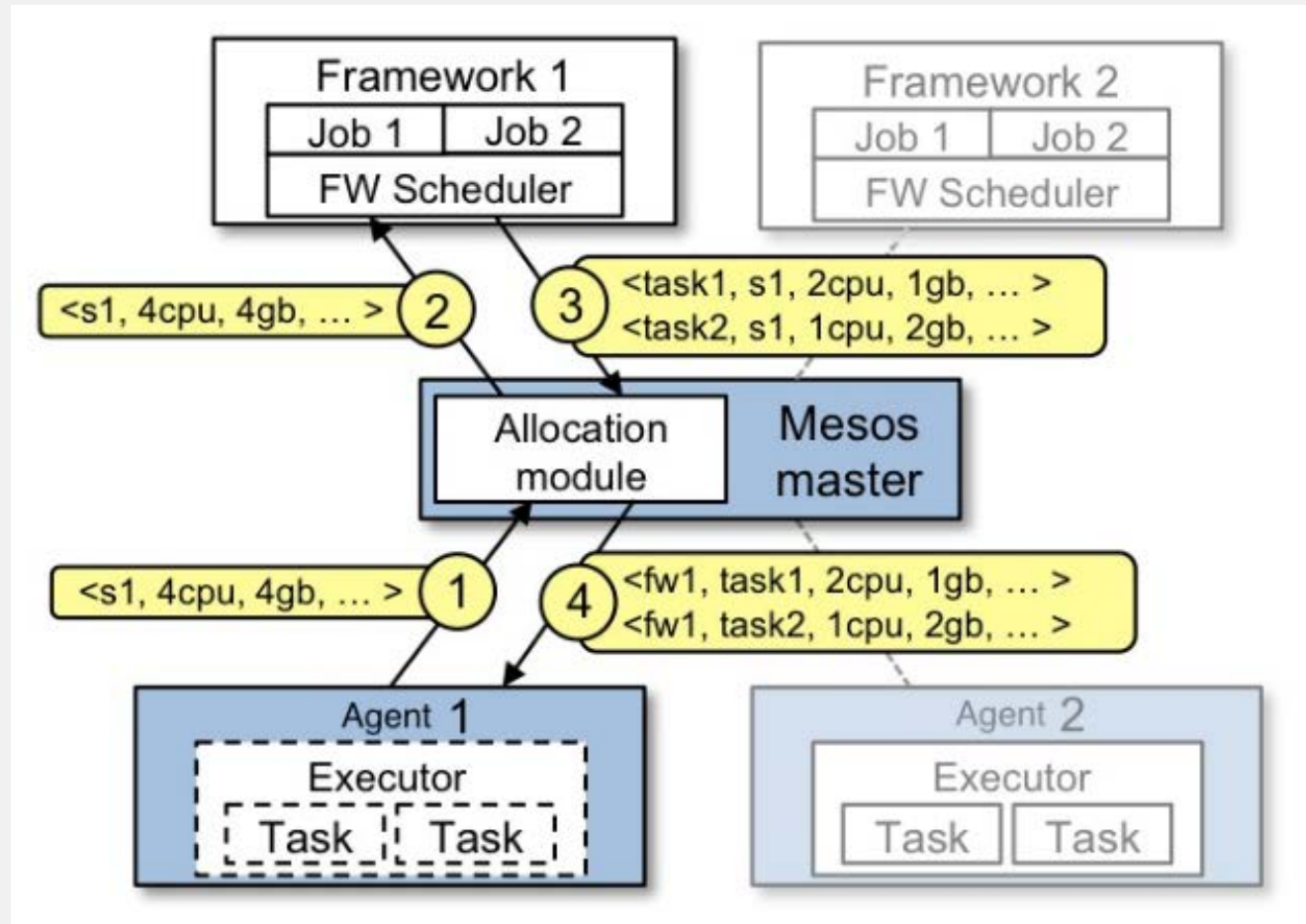 - obtaining node-heartbeats and forward them over to the YarnScheduler.

Mesos Architecture

- The master decides *how many* resources to offer to each framework according to a given organizational policy, such as fair sharing or strict priority.

Mesos Resource Offer

1. Agent 1 reports to the master that it has 4 CPUs and 4 GB of memory free. The master then invokes the allocation policy module, which tells it that framework 1 should be offered all available resources.

2. The master sends a resource offer describing what is available on agent 1 to framework 1.

3. The framework's scheduler replies to the master with information about two tasks to run on the agent, using <2 CPUs, 1 GB RAM> for the first task, and <1 CPUs, 2 GB RAM> for the second task.

4. Finally, the master sends the tasks to the agent, which allocates appropriate resources to the framework's executor, which in turn launches the two tasks (depicted with dotted-line borders in the figure). Because 1 CPU and 1 GB of RAM are still unallocated, the allocation module may now offer them to framework 2.

Mesos and YARN Convergence

- **Project Myriad**
- Mesos framework and a YARN scheduler that enables Mesos to manage YARN resource requests.