Predictive Auto-scaling in the Kubernetes Cluster Manager

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Outline I

1. Goals
   - General
   - Specific
2. Accomplishing General Goals: Cluster Managers and Kubernetes
   - Benefits of Cluster Managers
   - Overview of Cluster Managers
   - Kubernetes
3. Auto-scaling
   - Benefits of Auto-scaling
   - Overview of Auto-scaling
   - Current State of Auto-scaling in Kubernetes
4. Predictive Auto-scaling in Kubernetes
   - Theoretical
   - Implementation
5. Status of Work

Outline II

- Current State
- Future

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General

Contribute to distributed system's ability to reliably and resourcefully perform large, varying amounts of computational work.

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Specific

We seek to maximize the sum of two metrics: Efficient Resource Utilization and Quality of Service.

Efficient Resource Utilization (ERU)

A measure of whether an application is efficiently using the resources it is given.

Quality of Service (QOS)

A measure of whether the application is accomplishing its stated purpose.

Balancing ERU and QOS

Our goal is to maximize the summation of ERU and QOS. We want one of the following:

- ERU to increase and QOS to stay constant.
- ERU to stay constant and QOS to increase.
- Both!

Accomplishing these goals can have substantial real world impacts.

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Cluster Managers and their Benefits

Cluster managers abstract the notion of individual computers to present multiple, network connected computers as a single chunk of computing resources.

Cluster duties include:

- Admitting/running/monitoring user submitted jobs.
- Allocating resources to jobs on the cluster.

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Overview of Cluster Managers

There are a variety of different cluster managers:

- Borg
- Mesos
- Kubernetes

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Details of Kubernetes

Cluster managers each have their own way of talking about running applications on the cluster. . . Here are the most important terms:

- Pod
- Replication Controller
- Service

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Citations

Check out the k8s website.[1].

Citations I

Kubernetes Website. http://kubernetes.io.