CS 744: MESOS

Shivaram Venkataraman
Fall 2020
- Assignment 1: How did it go?
- Assignment 2 out tonight
- Project details
  - Create project groups
  - Bid for projects/Propose your own
  - Work on Introduction
COURSE FORMAT

Paper reviews

“Compare, contrast and evaluate research papers”

Discussion
How do we share CPU between processes?
CLUSTER SCHEDULING
TARGET ENVIRONMENT

Multiple MapReduce versions

Mix of frameworks: MPI, Spark, MR

Data sharing across frameworks

Avoid per-framework clusters
RESOURCE OFFERS

Framework 1
- Job 1
- Job 2
- FW Scheduler

Allocation module

Framework 2
- Job 1
- Job 2
- FW Scheduler

Slave 1
- Executor
  - Task
  - Task

Slave 2
- Executor
  - Task
  - Task

1. <s1, 4cpu, 4gb, ...>
2. <task1, s1, 2cpu, 1gb, ...>
3. <task2, s1, 1cpu, 2gb, ...>
4. <fw1, task1, 2cpu, 1gb, ...>
   <fw1, task2, 1cpu, 2gb, ...>
CONSTRAINTS

Examples of constraints

Constraints in Mesos:
Design Details

Allocation:
Guaranteed allocation, revocation

Isolation
Containers (Docker)
FAULT TOLERANCE

- Hadoop scheduler
- MPI scheduler
- Mesos master
- Standby master
- Standby master
- ZooKeeper quorum

Mesos slave:
- Hadoop executor
- MPI executor
- task
- task
- task
PLACEMENT PREFERENCES

What is the problem?

How do we do allocations?
CENTRALIZED VS DECENTRALIZED
CENTRALIZED VS DECENTRALIZED

Framework complexity

Fragmentation, Starvation

Inter-dependent framework
COMPARISON: YARN

Per-job scheduler

AM asks for resource
RM replies
COMPARISON: BORG

Single centralized scheduler

Requests mem, cpu in cfg
Priority per user / service

Support for quotas / reservations
SUMMARY

• Mesos: Scheduler to share cluster between Spark, MR, etc.
• Two-level scheduling with app-specific schedulers
• Provides scalable, decentralized scheduling
• Pluggable Policy? Next class!
DISCUSSION

https://forms.gle/urHSeukfyipCKjue6
What are some problems that could come up if we scale from 10 frameworks to 1000 frameworks in Mesos?
List any one difference between an OS scheduler and Mesos
NEXT STEPS

Next class: Scheduling Policy

Further reading
• https://www.umbrant.com/2015/05/27/mesos-omega-borg-a-survey/
• https://queue.acm.org/detail.cfm?id=3173558