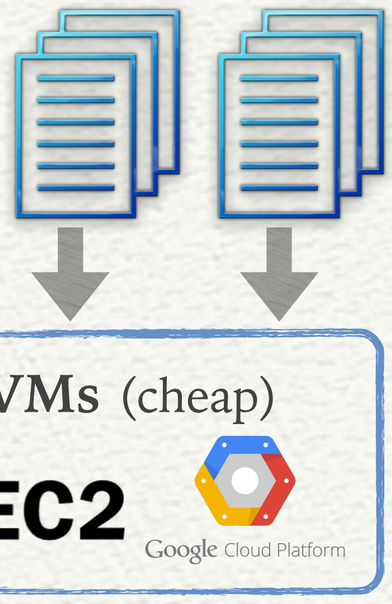
SpotOn: a batch computing service for the spot market

Supreeth Subramanya, Tian Guo, Prateek Sharma, David Irwin, Prashant Shenoy
University of Massachusetts Amherst

Problem Statement

Batch Jobs (disruption tolerant)



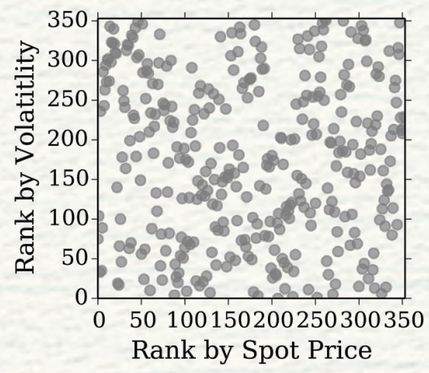
Cloud spot markets (>4000 on Amazon and Google)

VM Cost: Discounted (up to 90% off on-demand price)

VM Availability: Not guaranteed and Revocable anytime

BUT ...

Spot markets are complex (*fig. volatility vs. price of 350 Spot markets in EC2*)

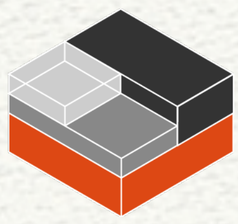


Can we run batch jobs at on-demand *performance* but at spot market *cost*?

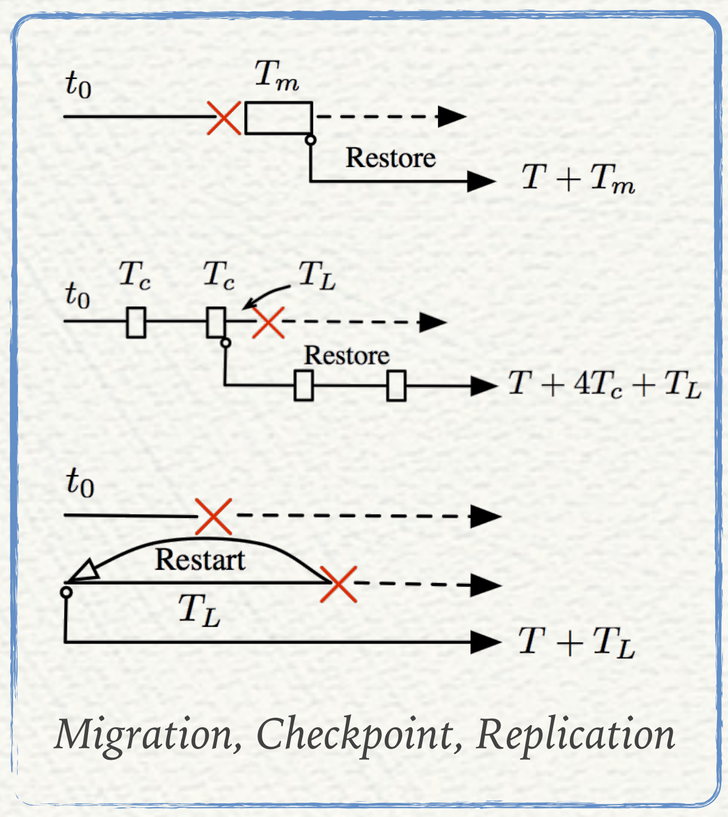
Selecting the optimal combination of spot market and fault-tolerance mechanism for a job depends on both the price and volatility of the market, as well as a job's resource usage

SpotOn overview

1. Submit jobs as LXC containers



2. Model fault-tolerance mechanisms for the job



Migration, Checkpoint, Replication

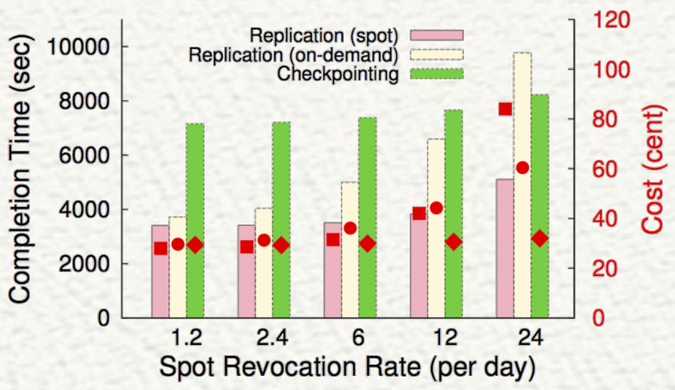
3. For all spot markets, compute cost of each mechanism

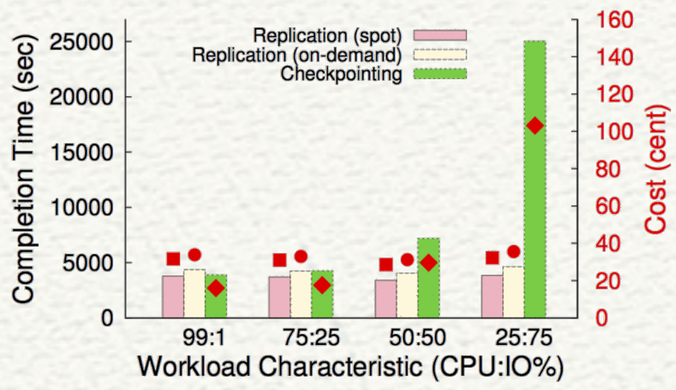
4. Select the lowest cost market and acquire spot VM

repeat on spot eviction

Experimental evaluation

Best choice of fault-tolerance mechanism is a function of spot market and job characteristics





Spot markets have significant arbitrage opportunities

On Google cluster trace, SpotOn lowered cost by 91.9% with little impact on performance

Choosing from multiple fault-tolerance mechanisms lowers cost relative to just using checkpoint