Research on Cloud Computing @ REINS

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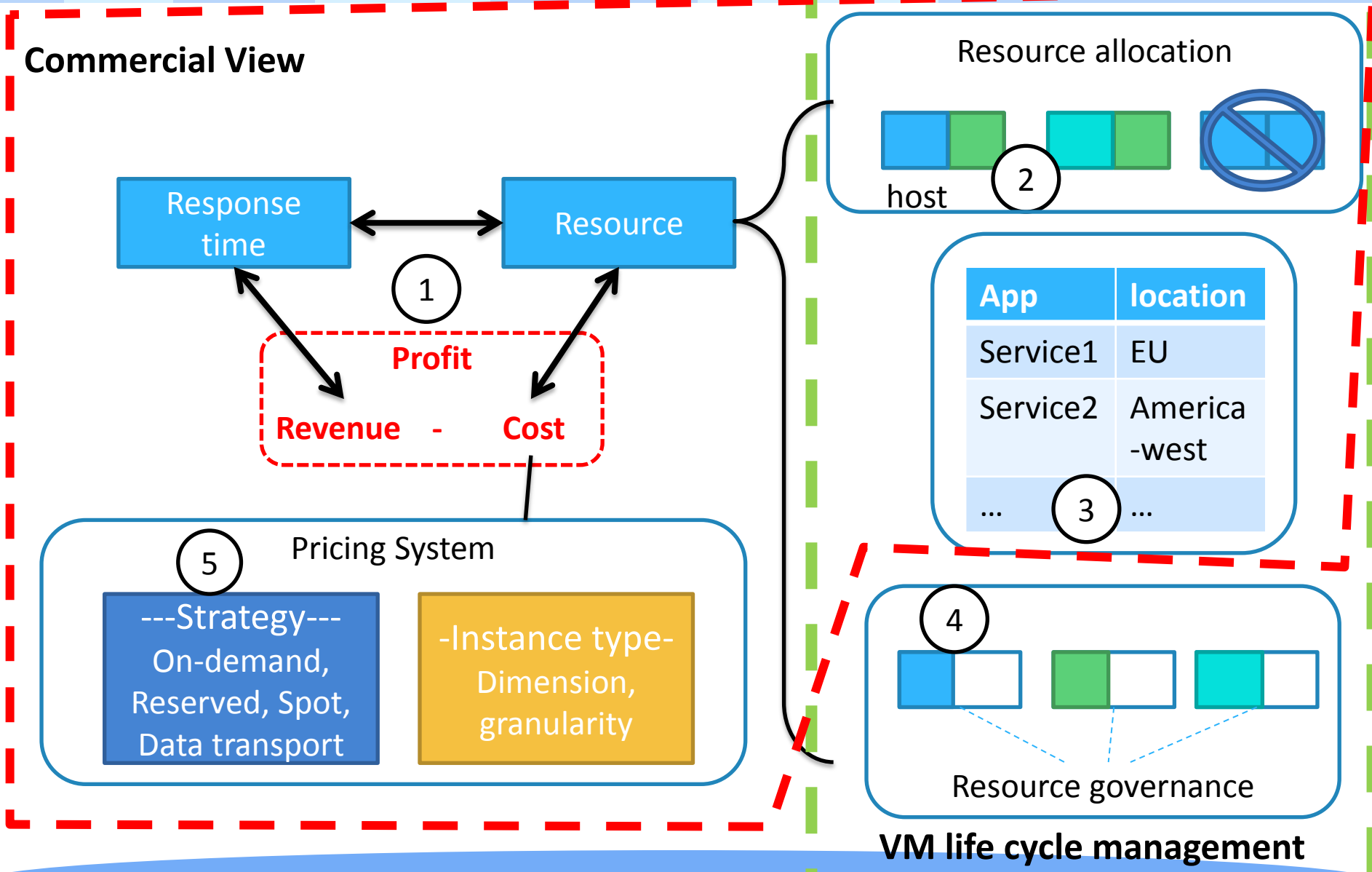
Overview

- Cloud resource management
- Cloud federation
- Data storage
- Data processing

Cloud Resource Management



Performance Model

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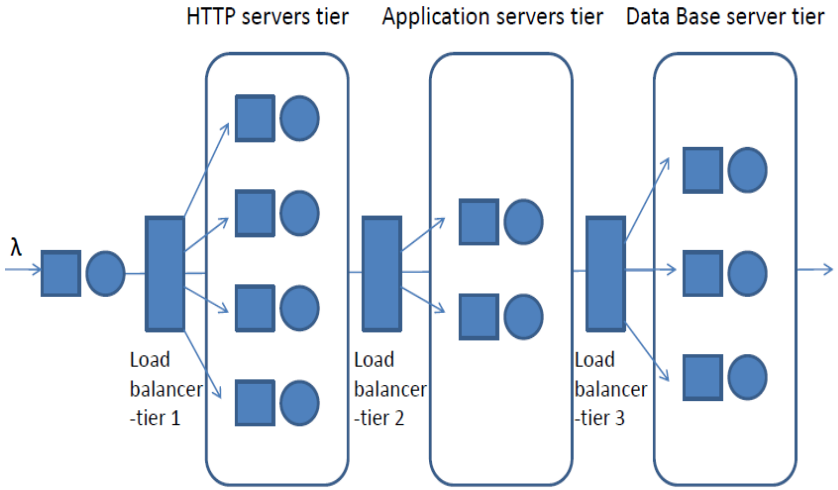
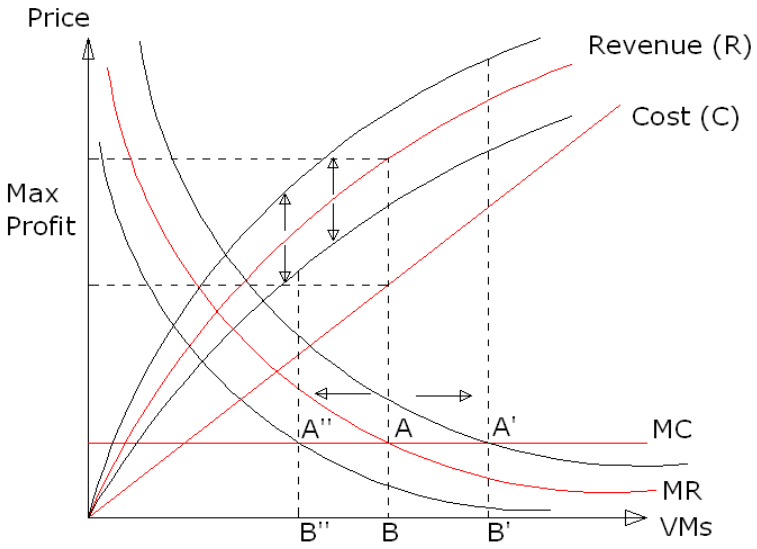
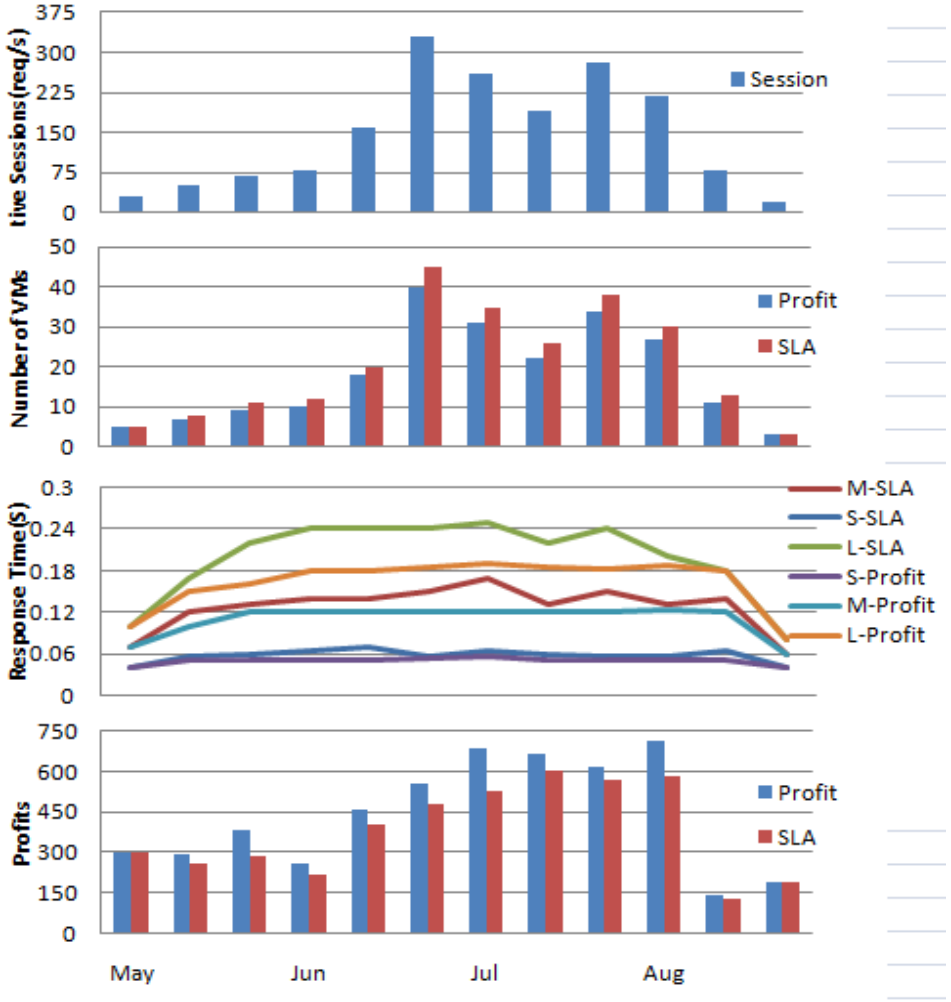
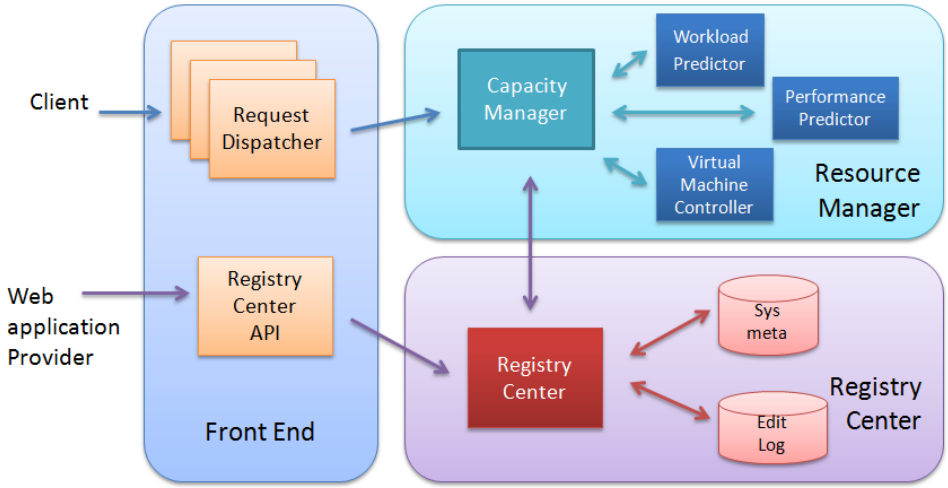
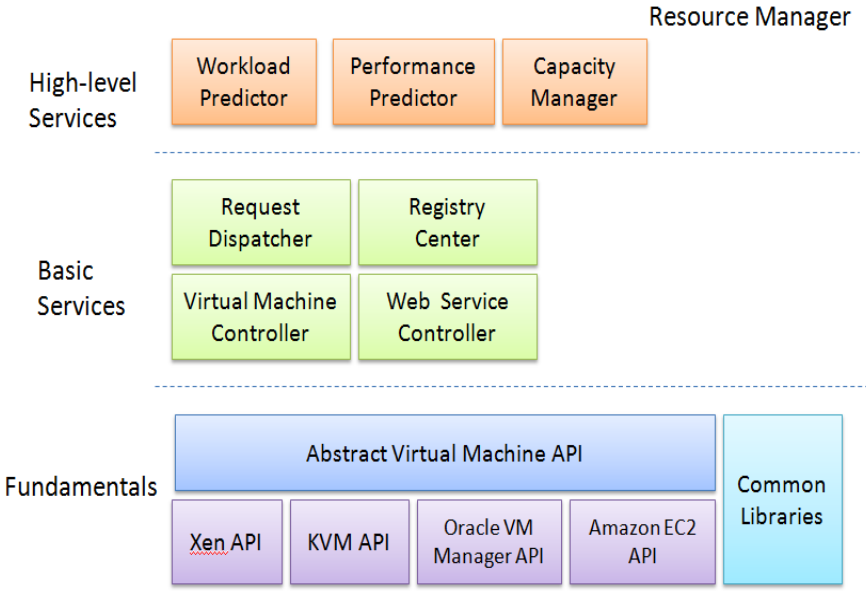






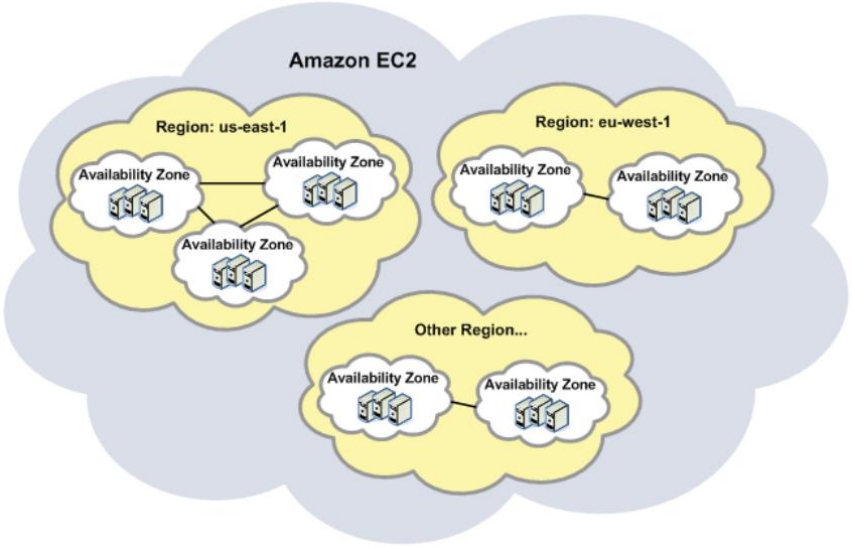
Performance Model





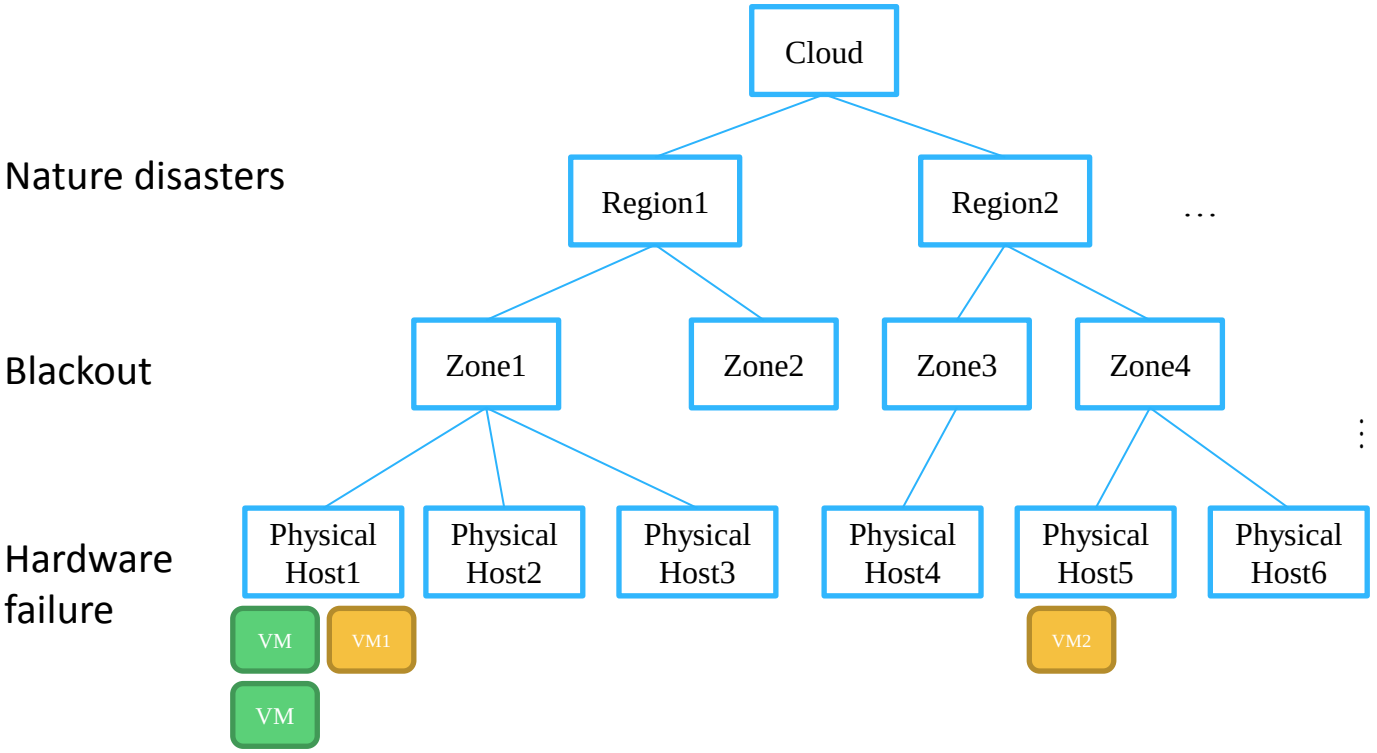
Availability Model

- Motivation
  - Amazon EC2
    - **Region and availability zone**
  - Microsoft Azure
    - ***Fault and Upgrade domains***
    - *guarantee 99.95% availability when you deploy two or more role instances in different domains*



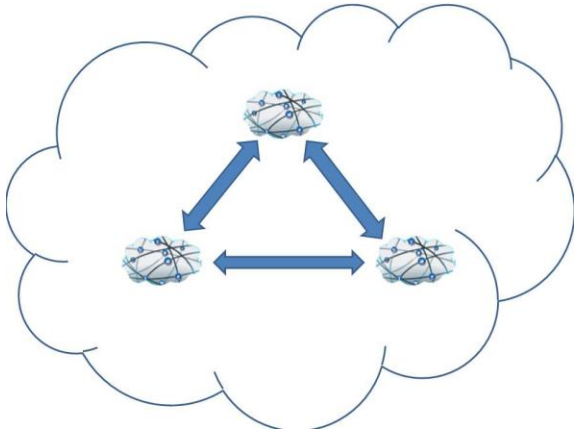
Availability Model

- Approach
  - Hierarchy Tree Structure
  - Conditional-probability Availability Model



Cloud Federation

- Message transmission & collaboration among Clouds



- An ideal solution to
  - tasks overload for a single Cloud
  - user's need to transplant their Cloud-apps
  - a new business model for Cloud providers

Cloud Federation

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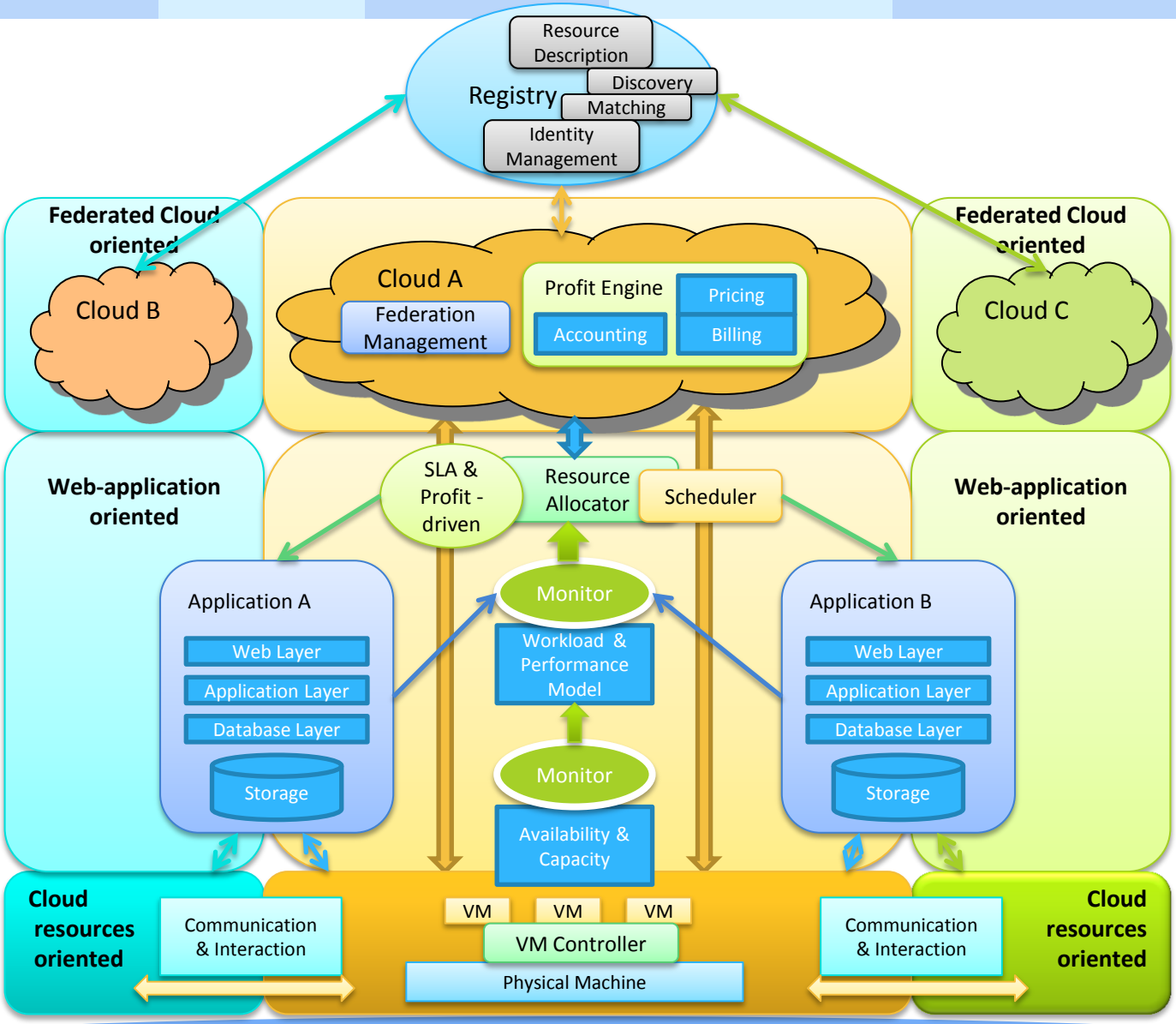
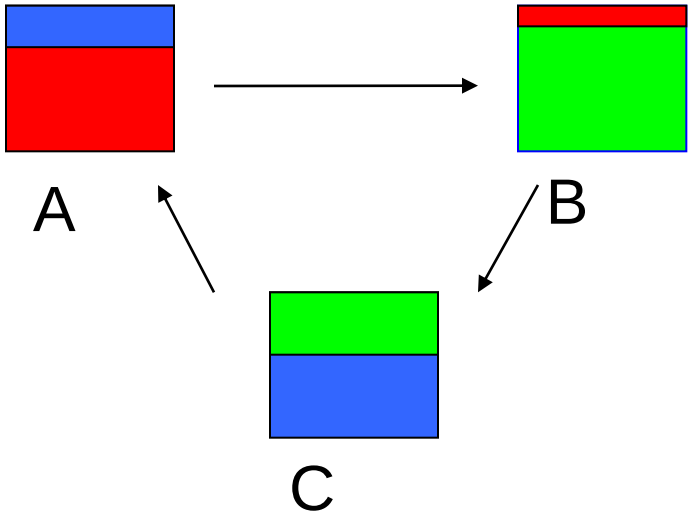
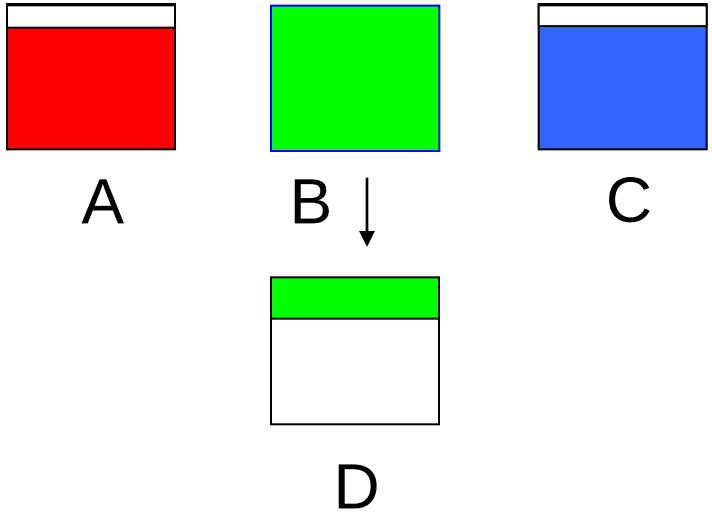


Cloud Federation

- Problems
  - Cycle leased



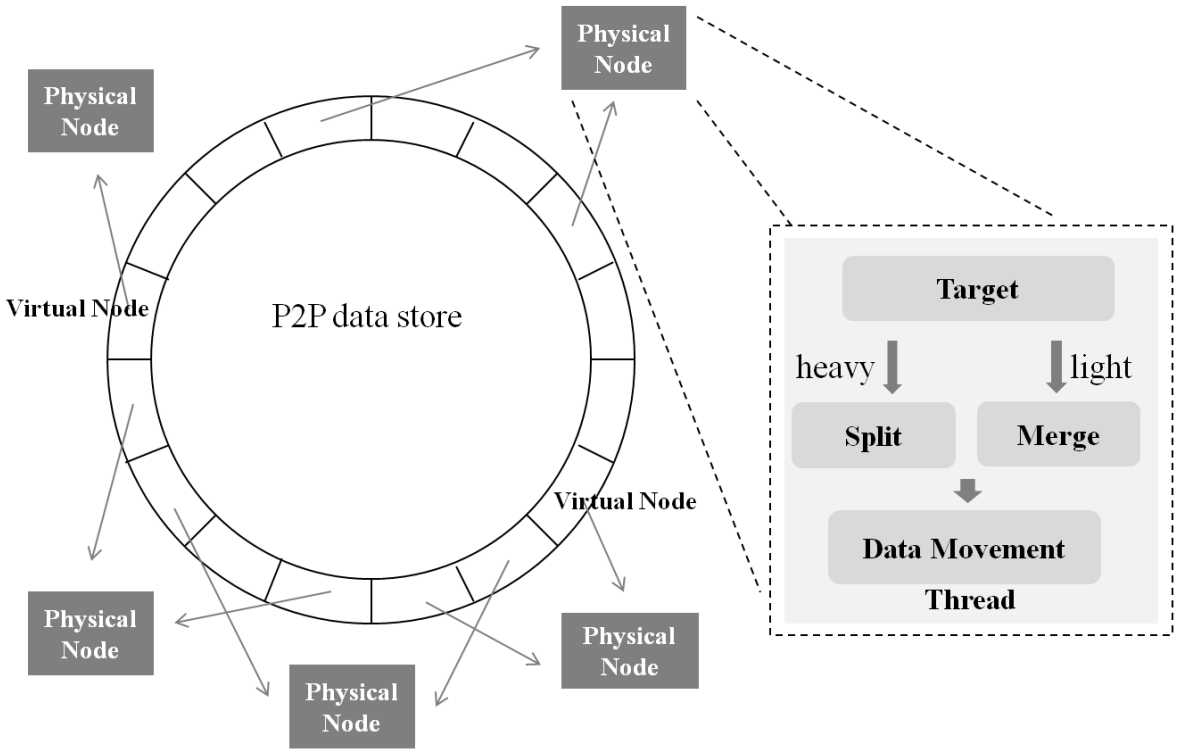
remote running



cycle solution

Dynamic Data Balance in Cloud

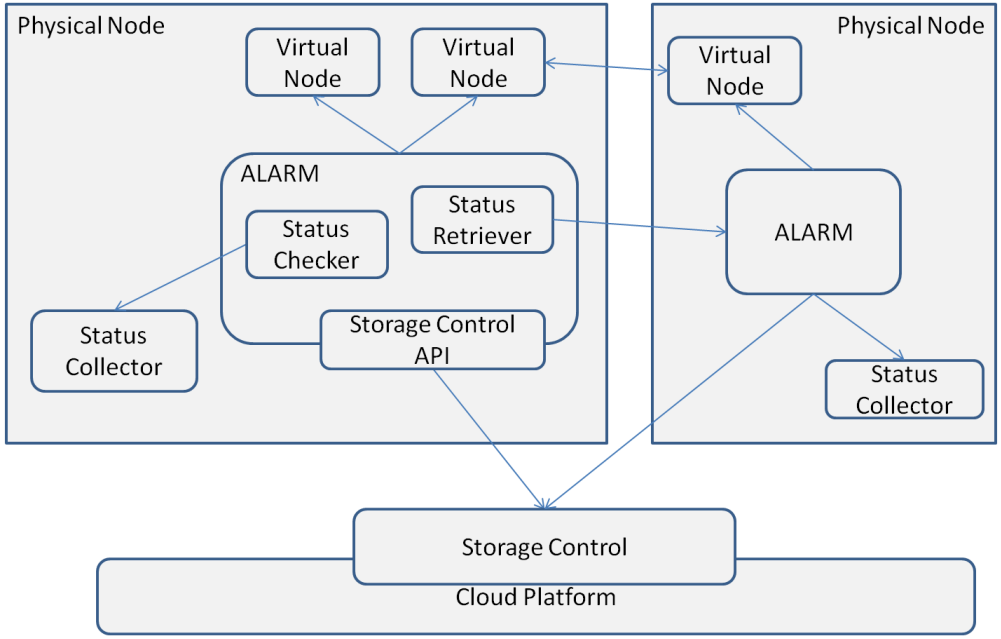
- ALARM: Autonomic Load-Aware Resource Management for P2P Key value Stores in Cloud



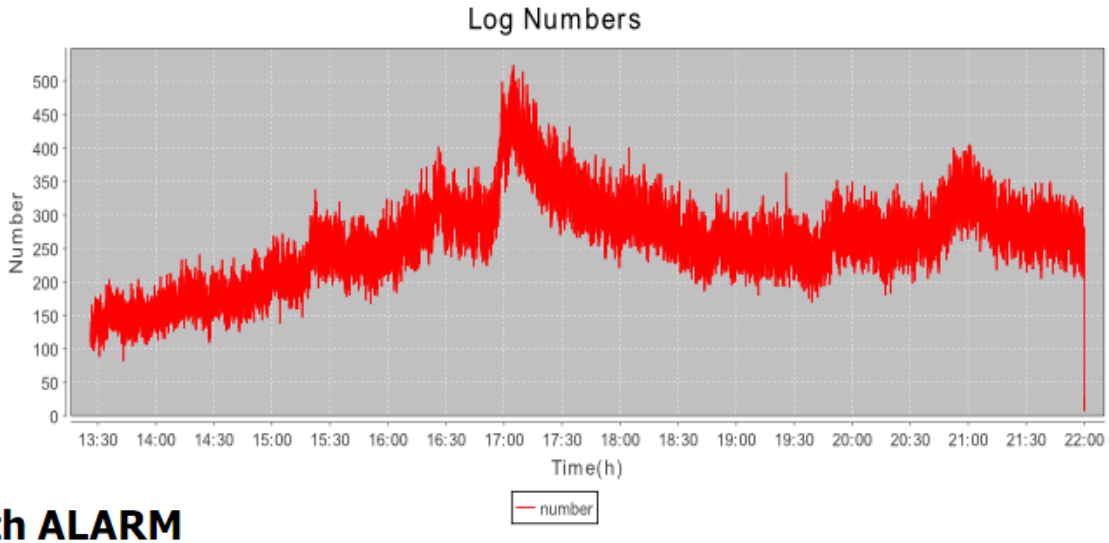
- **Physical Node**
- **Virtual Node**

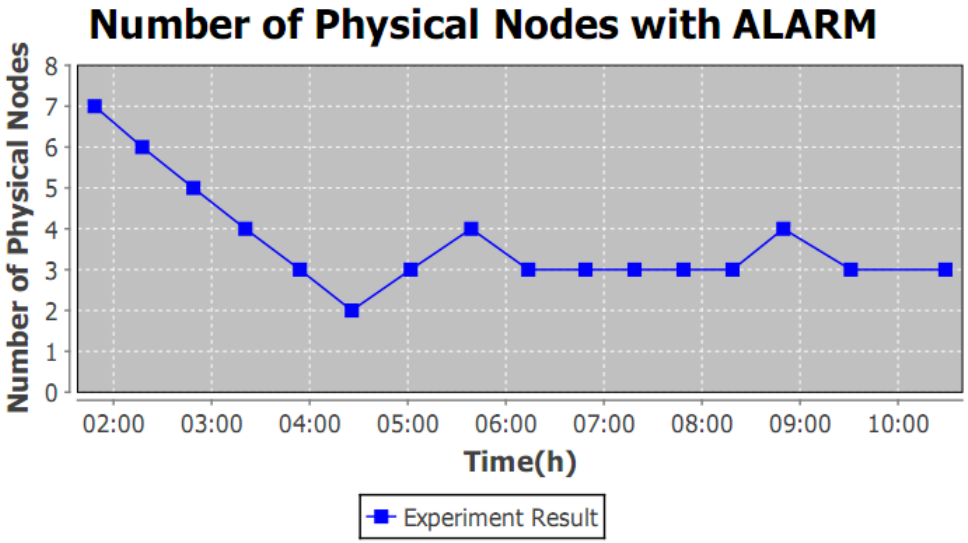
ALARM

- Storage Control : Interact with cloud platform, maintain storage info
- Status Collector : collect the resource utilization on the local node
- Status Checker : execute the target operation
- Status Retriever : retrieve info from other nodes in the system



Experiments

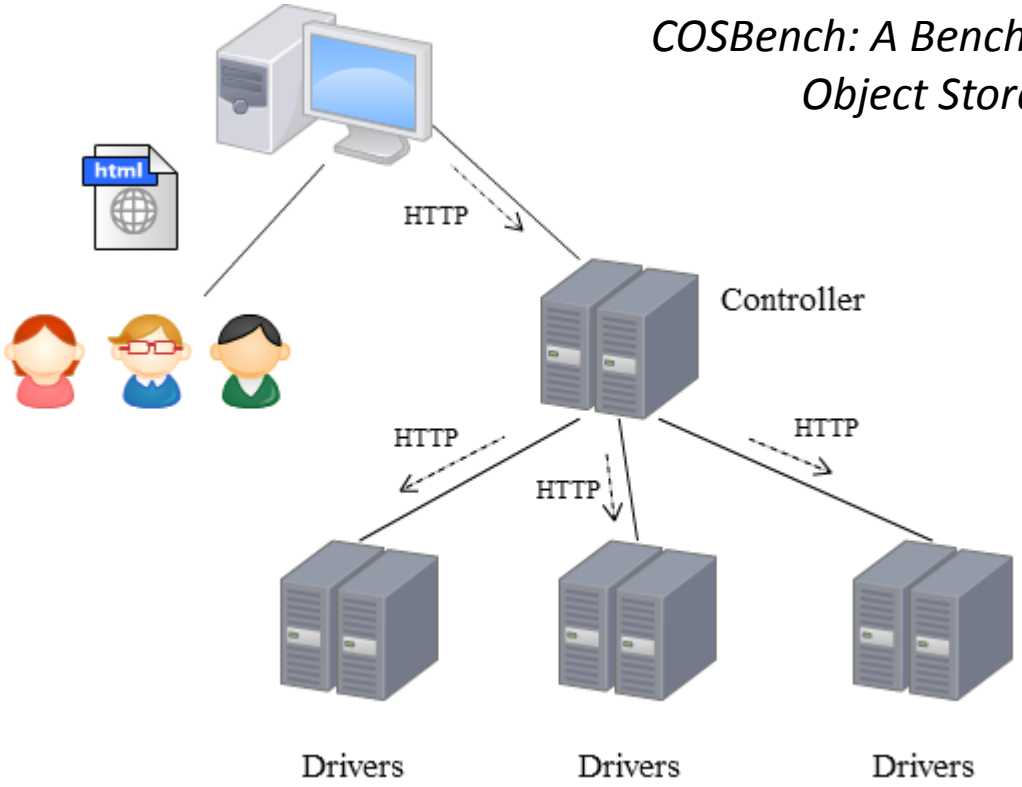




the number of client requests per second

Performance Benchmark

- Implementing benchmark suite for characterizing the performance of object storage systems



COSBench: A Benchmark Tool for Cloud Object Storage Services

Workload Modeling

- Define workload model that resembles the usage patterns of a variety of real world systems/applications
  - Read intensive
  - Write intensive

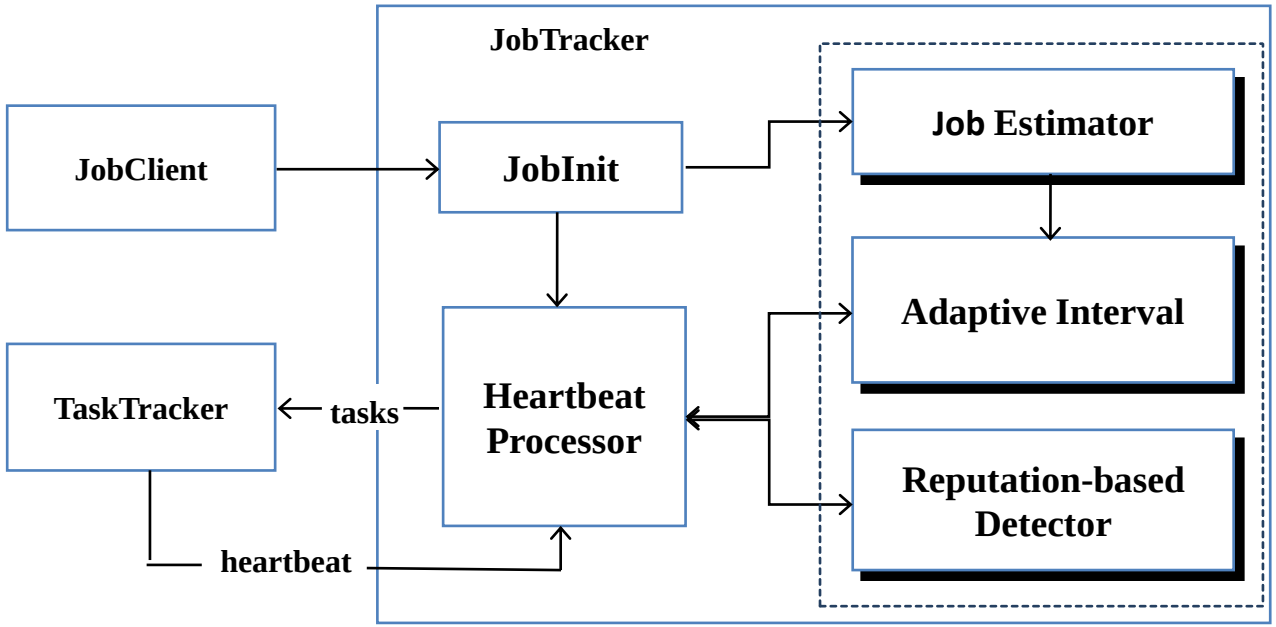
Fault tolerance for MapReduce

- Delayed detection of the failure worker
  - increase execution time
  - mis-blacklist
  - unnecessary backup tasks

- Goal
  - effectively detect the failure in the MapReduce cluster
  - Adaptive failure detection via heartbeat under Hadoop

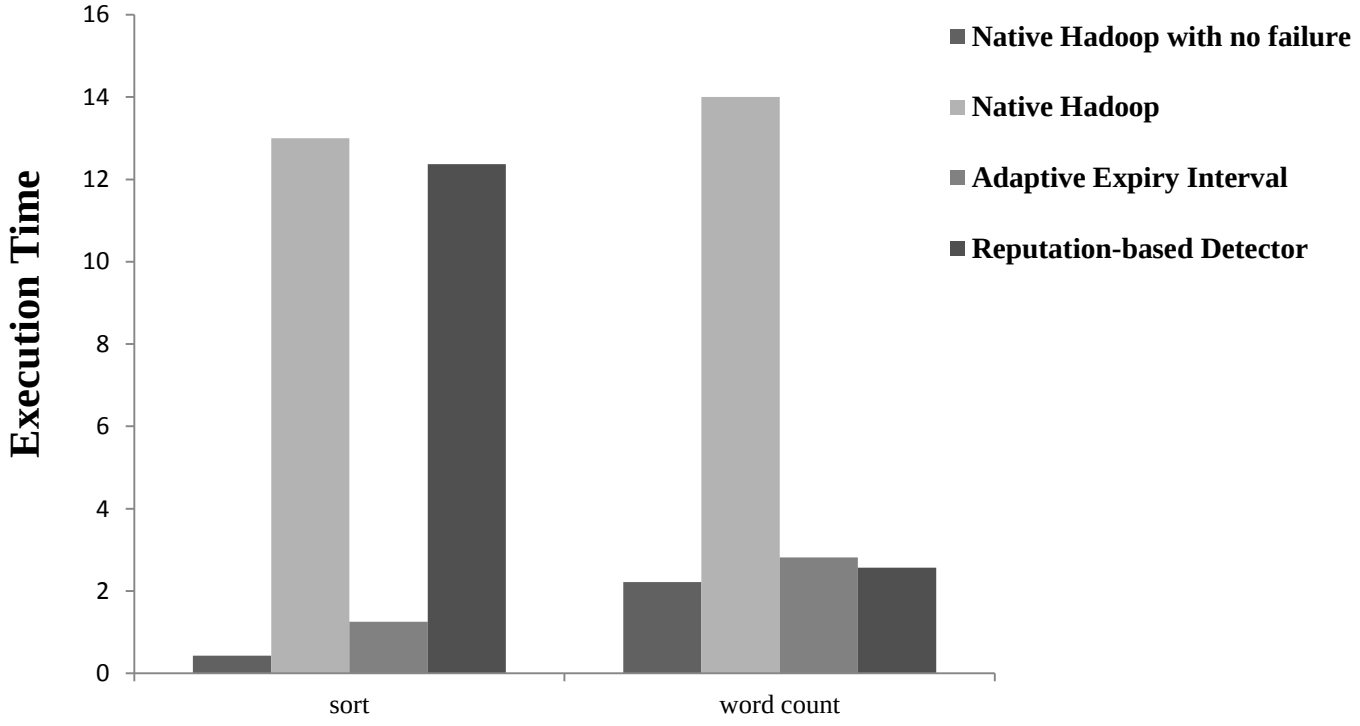
Adaptive failure detection

- Adaptive Interval
- Reputation-based Detector



Experiments

- Results
  - Adaptive interval is better for small jobs
  - Reputation-based detector is better for large jobs



Other issues

- X10 in cloud
- Mongo DB in Data balancing
- Lucene and Solr
- ……

Thank You!