CumuloNimbo Year 3 Review

Brussels, November 27, 2013

FP7-257993

Platform Benchmark

Kathryn Bean, SAP

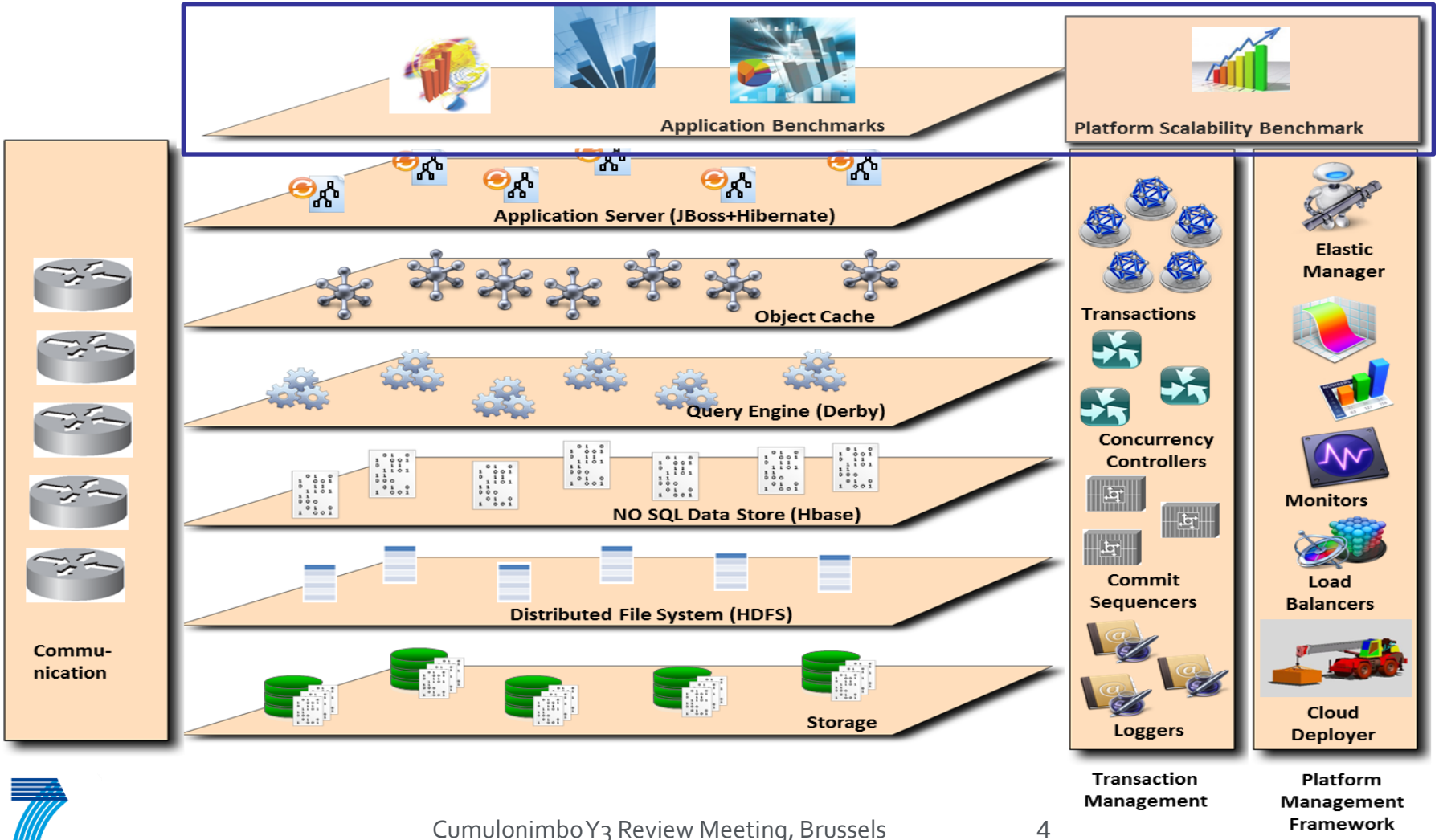
Outline

- Introduction
- Y3 Focus
- CumuloNimbo PaaS Evaluation

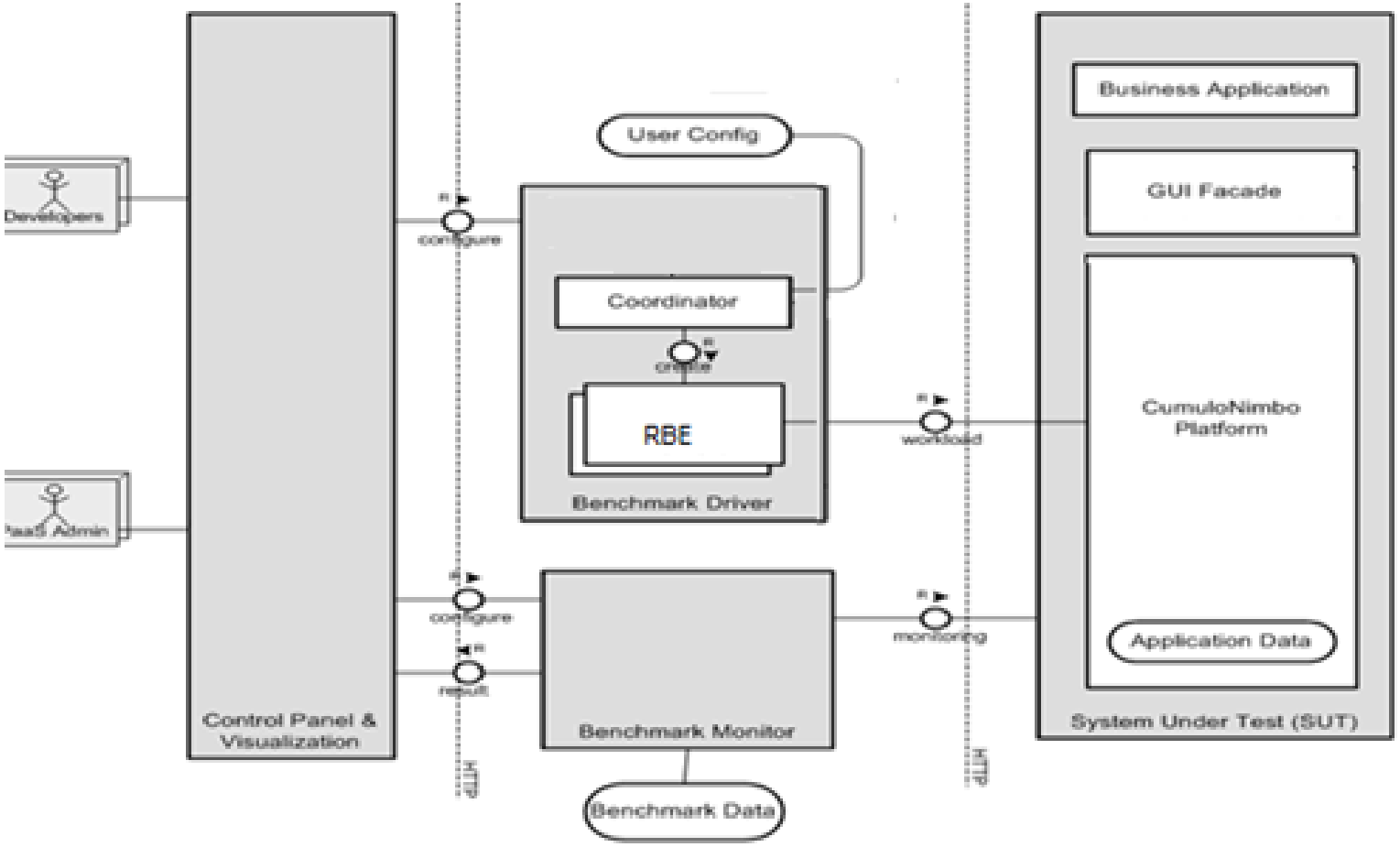
Introduction

- Platform benchmark for evaluation of CumuloNimbo PaaS
  - Order Processing Enterprise Application
  - Load Generation Driver
- Assess performance and scalability behaviour
- Based on TPC-W benchmark
- Real world diverse load generation capability
  - Linearly increasing/decreasing workload

Cumulonimbo Stack



Platform Benchmark Architecture



Components of Benchmark Platform

- J2EE Enterprise application - major modifications to adapt to distributed CumuloNimbo PaaS environment and to implement MVC
- Remote Browser Emulator (RBE) - rewritten to perform elastic CumuloNimbo evaluation and improve RBE performance
- Data Population Utility
- Visualisation Application - rewritten to integrate this application with RBE
- Image Generator

Y3 Focus

New Features Related to All Benchmark Components

- Improve message logging capability
  - Integration with Log4J
- Improve benchmark configuration capabilities
  - Configuration parameters are stored into a single property file
- Integration with CumuloNimbo platform

New Features Related to Enterprise Application and RBE

- J2EE Enterprise Application
  - Implement **M**odel (EJB) **V**iew (JSP) **C**ontroller (servlets)
  - Adapt to the distributed CumuloNimbo PaaS environment
- Remote Browser Emulator (RBE)
  - Use HTMLUnit API to simulate users' clicks
  - Save evaluation statistics into a single database schema
    - In its current implementation, using MySQL RDBMS
  - Within one user's session, Shopping, Browsing, Ordering mixes are selected based on probability vector P = <Pshop, Pbrow, Porder>
  - Modify thread scheduling algorithm to perform elastic experiments
    - Load variation based on trapezoid shape function

New Features Related to Visualisation Application

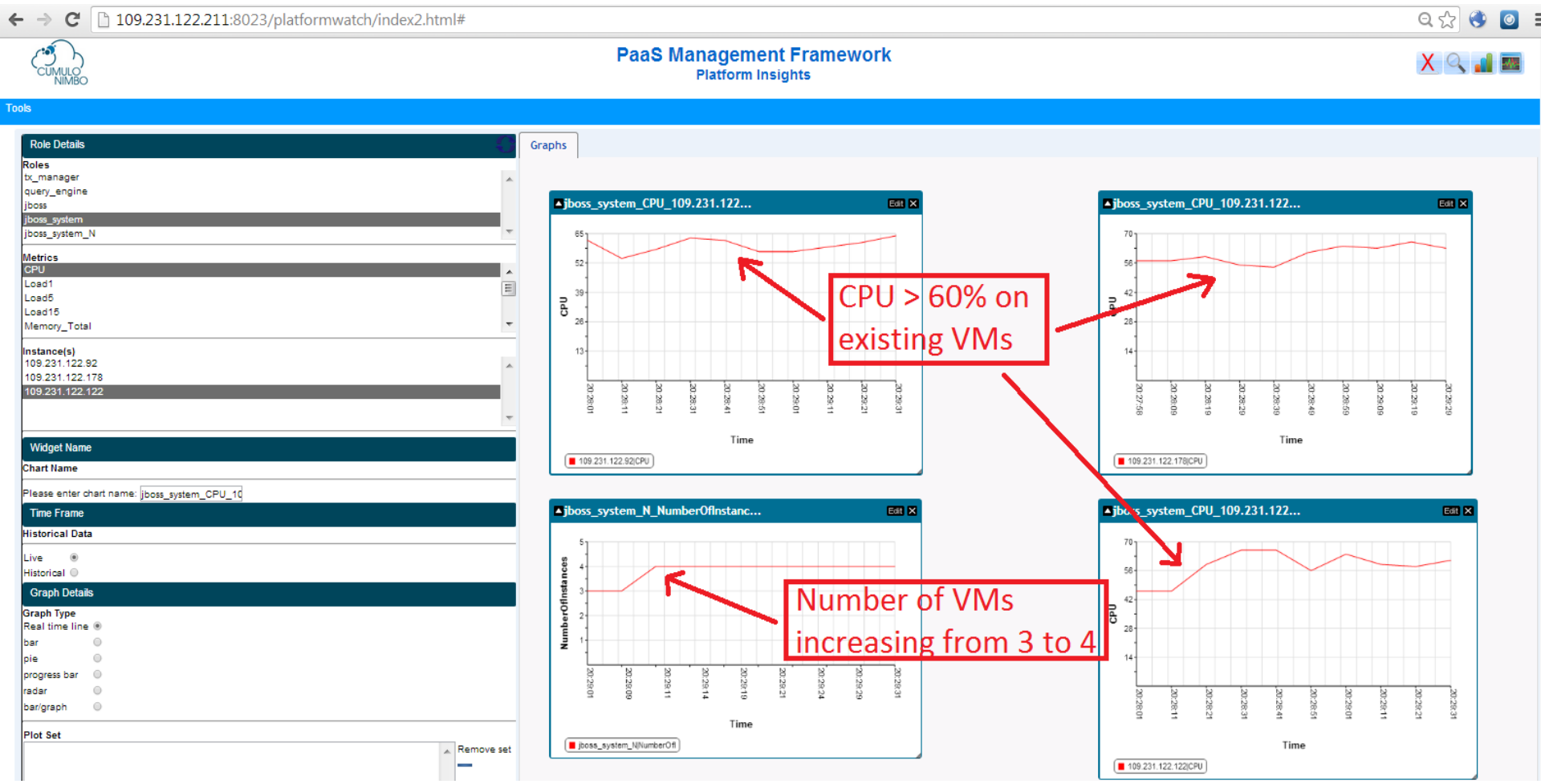
- Query MySQL database to obtain CumuloNimbo evaluation statistics based on benchmark user's request
  - Response time histograms
    - Web interactions mixes e.g. shopping, browsing and ordering
    - Web Interactions e.g. BuyConfirm, OrderInqury etc
  - Throughput saved over the course of the benchmark application run

Cumulonimbo Evaluation

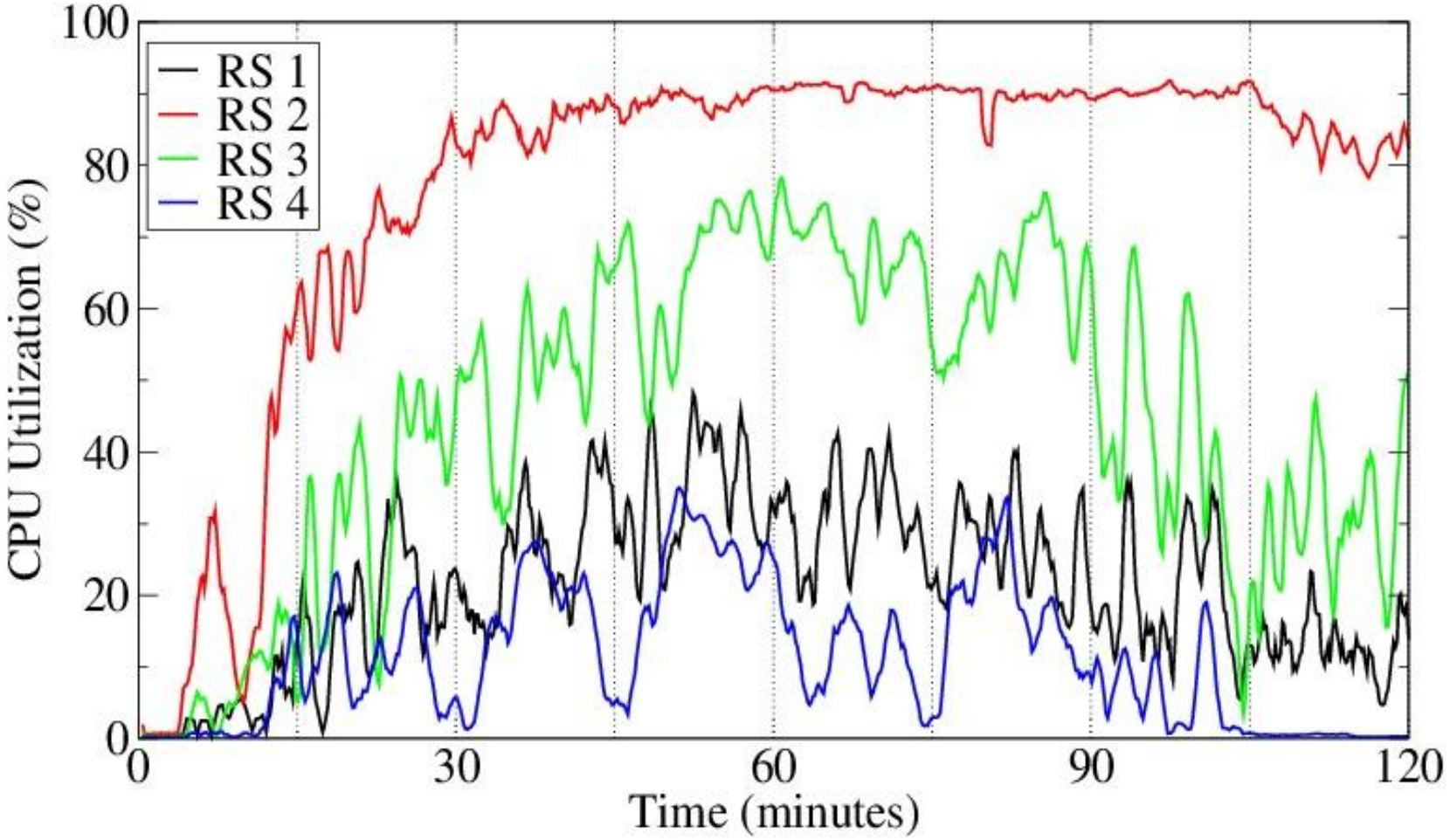
CumulonNimbo Elasticity Evaluation

- Hardware Configuration
  - Node A: Remote Browser Emulator (RBE)
  - Node B: Platform Management Framework (PMF)
  - Node C: Transaction Manager (TM)
  - Node D: Zookeeper, HDFS, Hbase master
  - Node E_k : Hbase region servers (k=1,…,4)
  - Node F_j : Jboss and Derby servers (j=1,…,4)
- RBE Configuration:
  - Measurement interval
  - Load distribution – trapezoid shaped
    - Ramp-up: Linearly increase 1 - 60 Ebs over 45 min, each EB starts 45 sec. after previous one
    - Run all 60 Ebs for a further 15 min.
    - Rump-down: symmetrical to Ramp-up (approximately)
  - Probability vector of web mixes: $<p_{br}, p_{sh}, p_{or}>=<0,1,0>$
- Key Performance Indicator
  - Histogram of response time
  - Throughput over time and
  - CPU utilization on Nodes F_j (j=1,…,4), E_k (k=1,…,4)

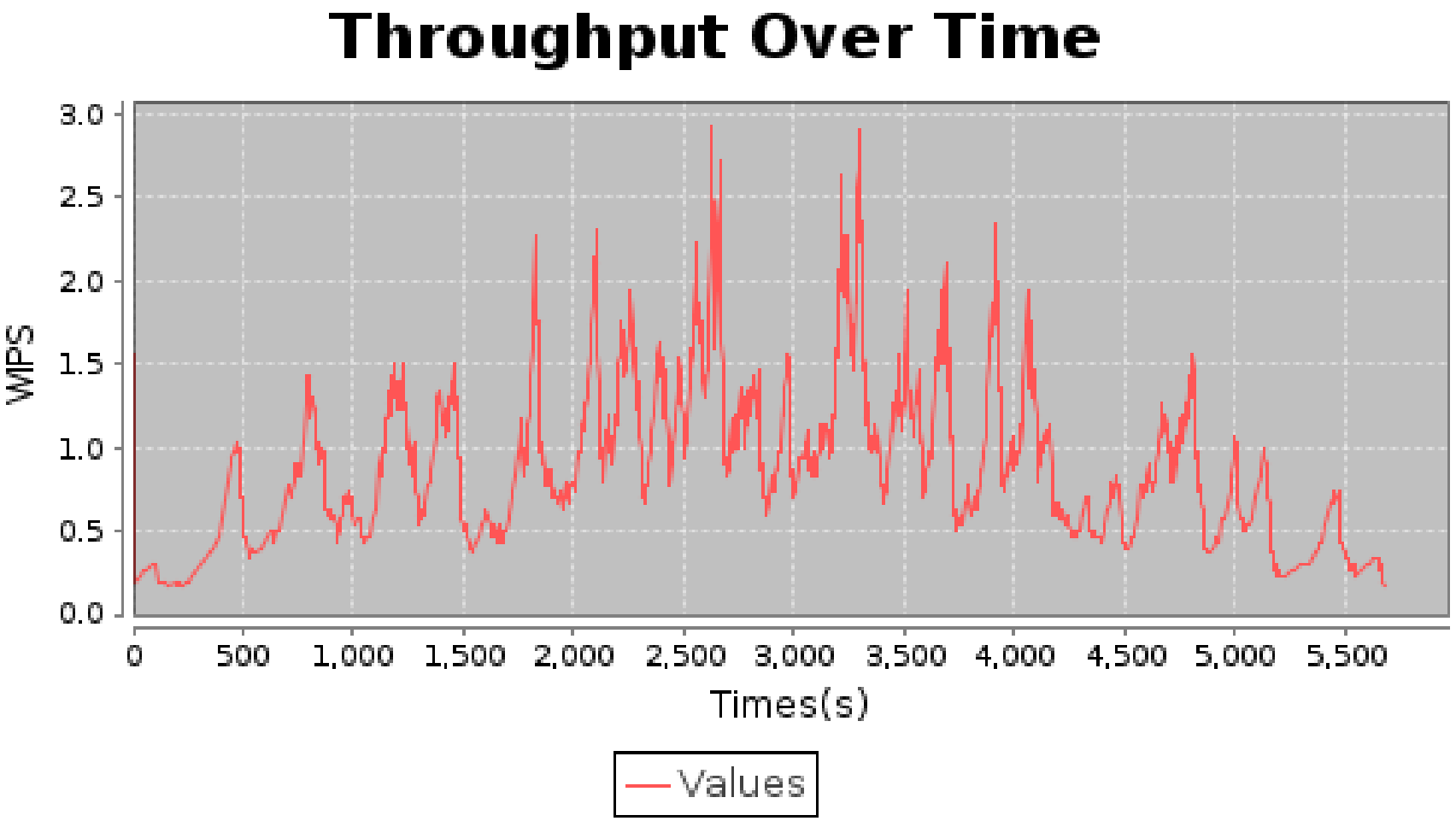
Increase in the Number of JBoss/Derby VMs



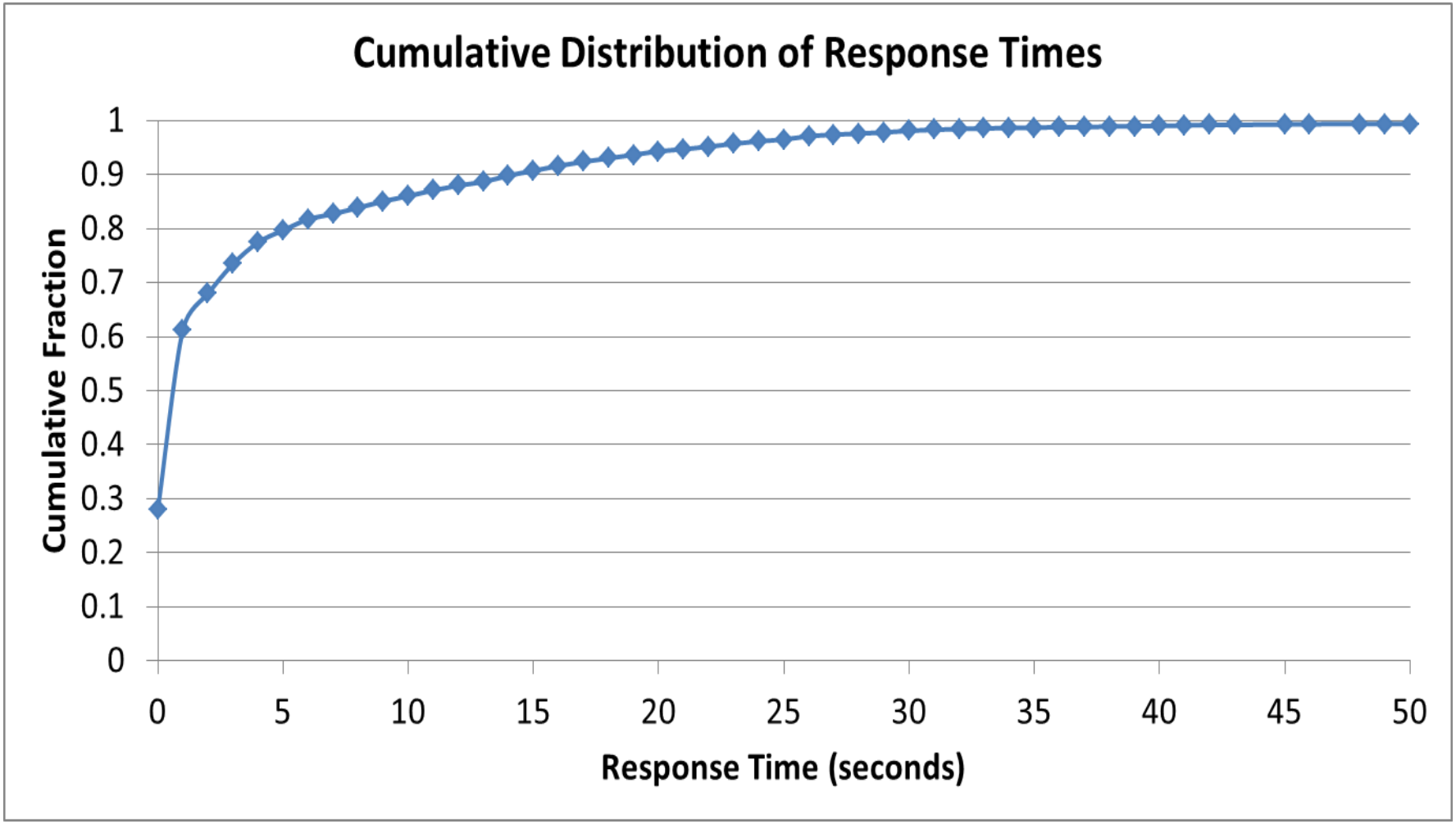
CPU Utilization of the VMs with the HBase Region Servers



Throughput: Web Interactions Per Second



Response Times



Thank You.

Questions?