

# PERFORMANCE & SCALABILITY OF N-TIER WORKLOADS IN IaaS CLOUDS

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## MOTIVATION & PROBLEM STATEMENT

- Clouds are much popular, but not a mature technology .
- More experimental studies are needed to better understand hidden characteristics.
- Multi-Tier applications are complex, thus migration and correct configuration on cloud is challenging.

We analyzed the performance and scalability when migrating n-tier applications from a traditional datacenter to an Infrastructure as a Service (IaaS) cloud.

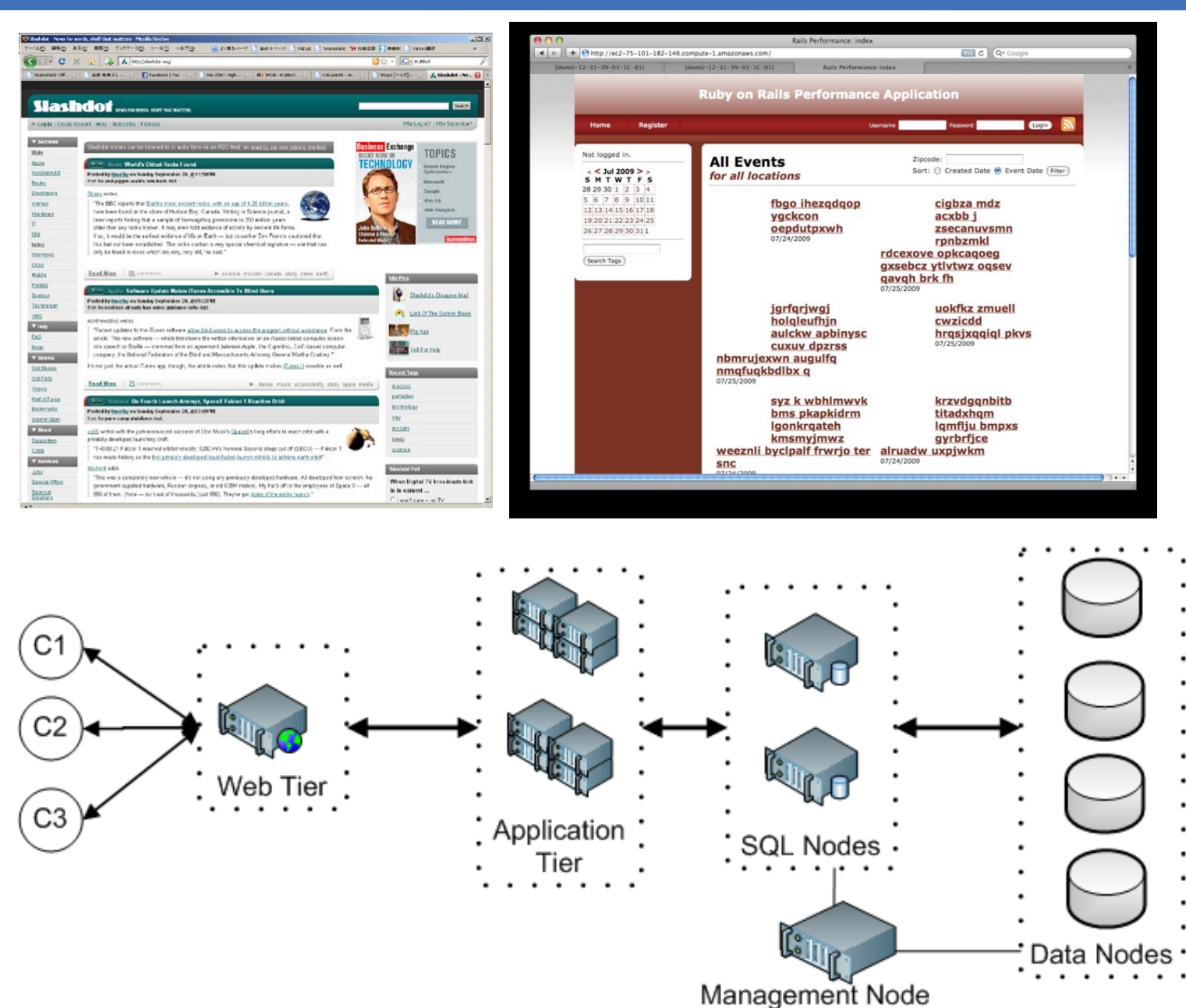
## BENCHMARKS, CLOUDS & EXPERIMENTS

### Benchmarks

- RUBBoS
- RUBiS
- CloudStone

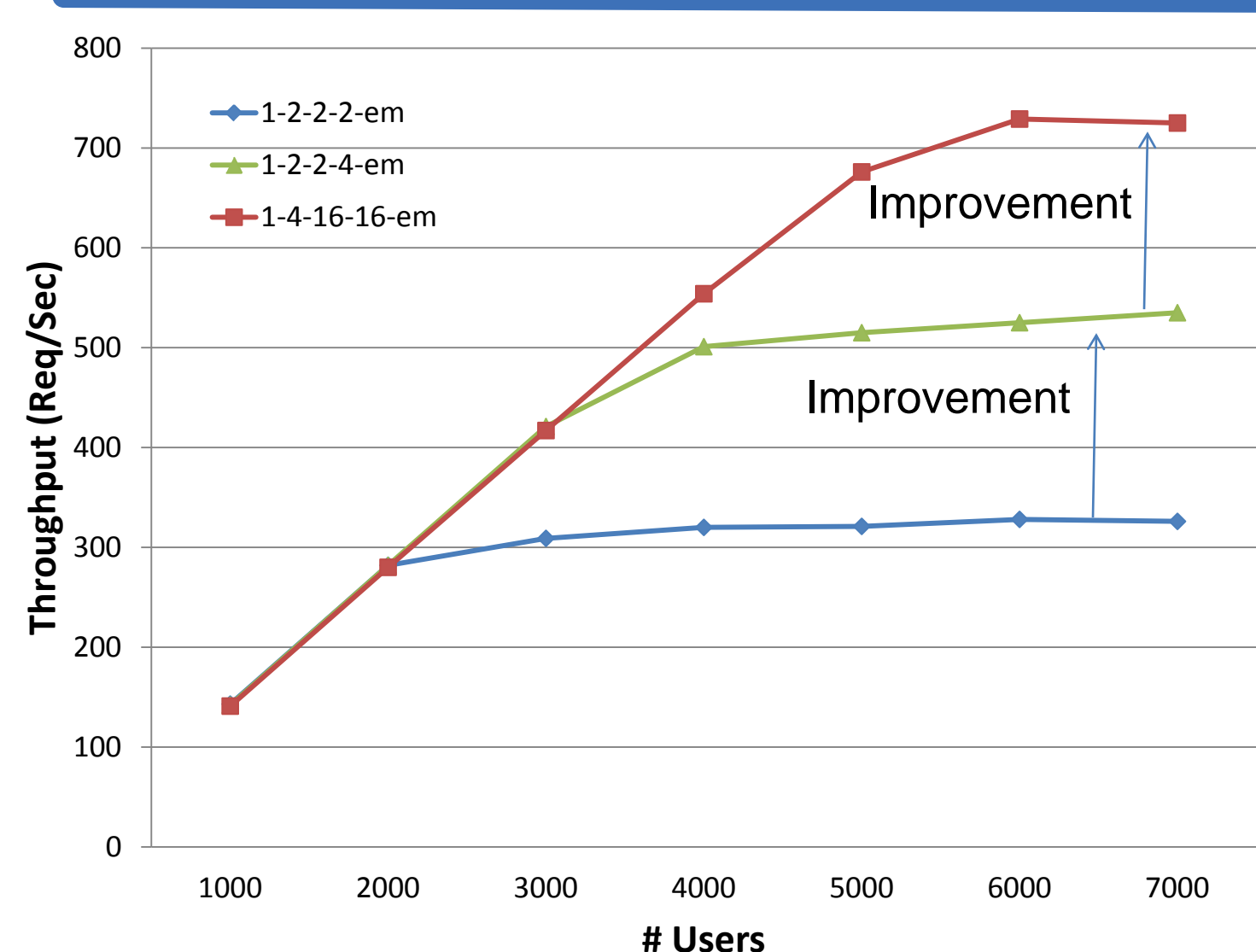
### Clouds

- Amazon EC2
- OpenCirrus
- Emulab
- Wipro

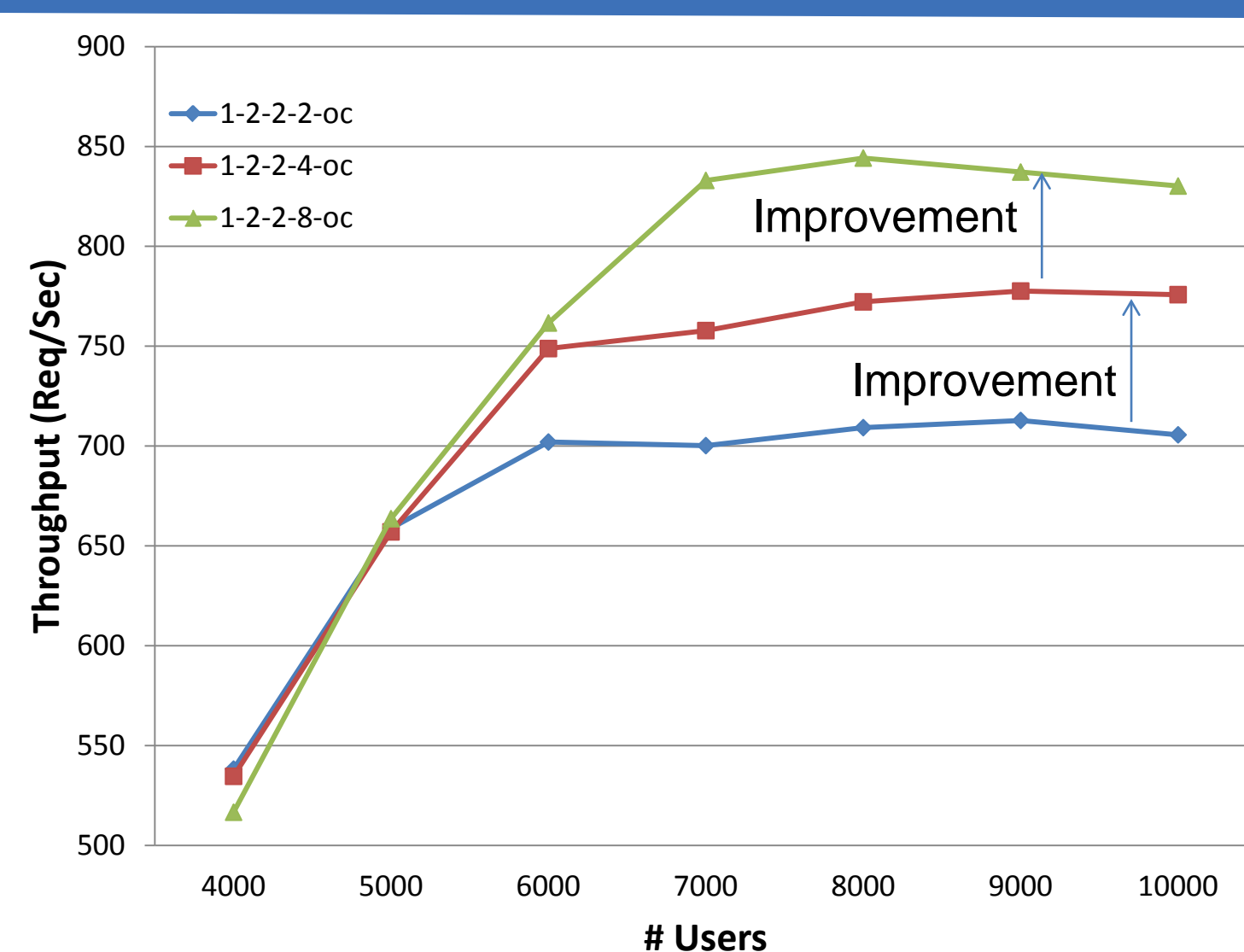


Type	Emulab	Open Cirrus	Amazon EC2
Experiments	8124	430	1436
Node	95682	4480	25846
Configurations	342	23	86
Data points	3210.6 M	2.3 M	672 M

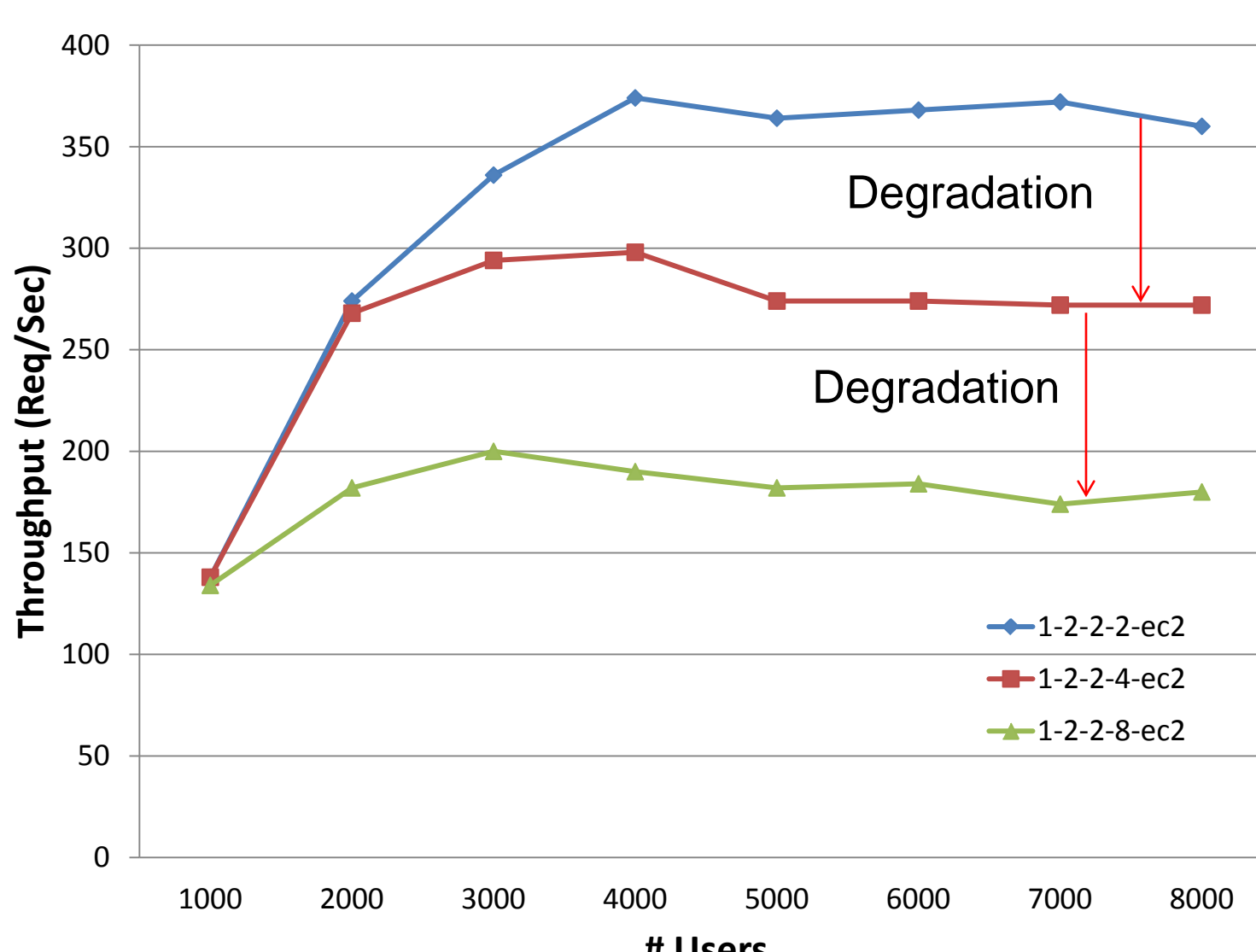
## VARIATIONS IN SCALABILITY



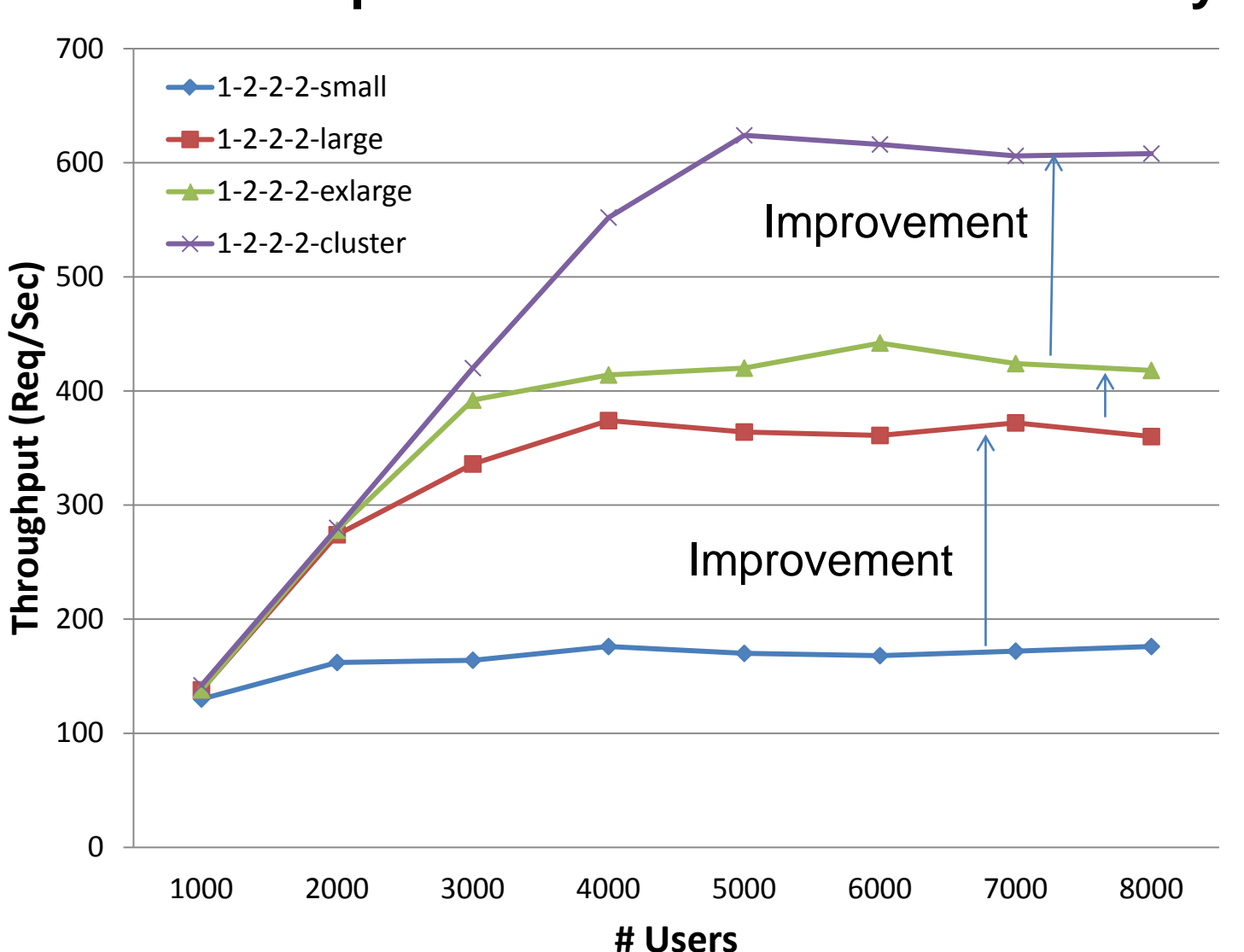
Emulab – Horizontal Scalability



OpenCirrus – Horizontal Scalability

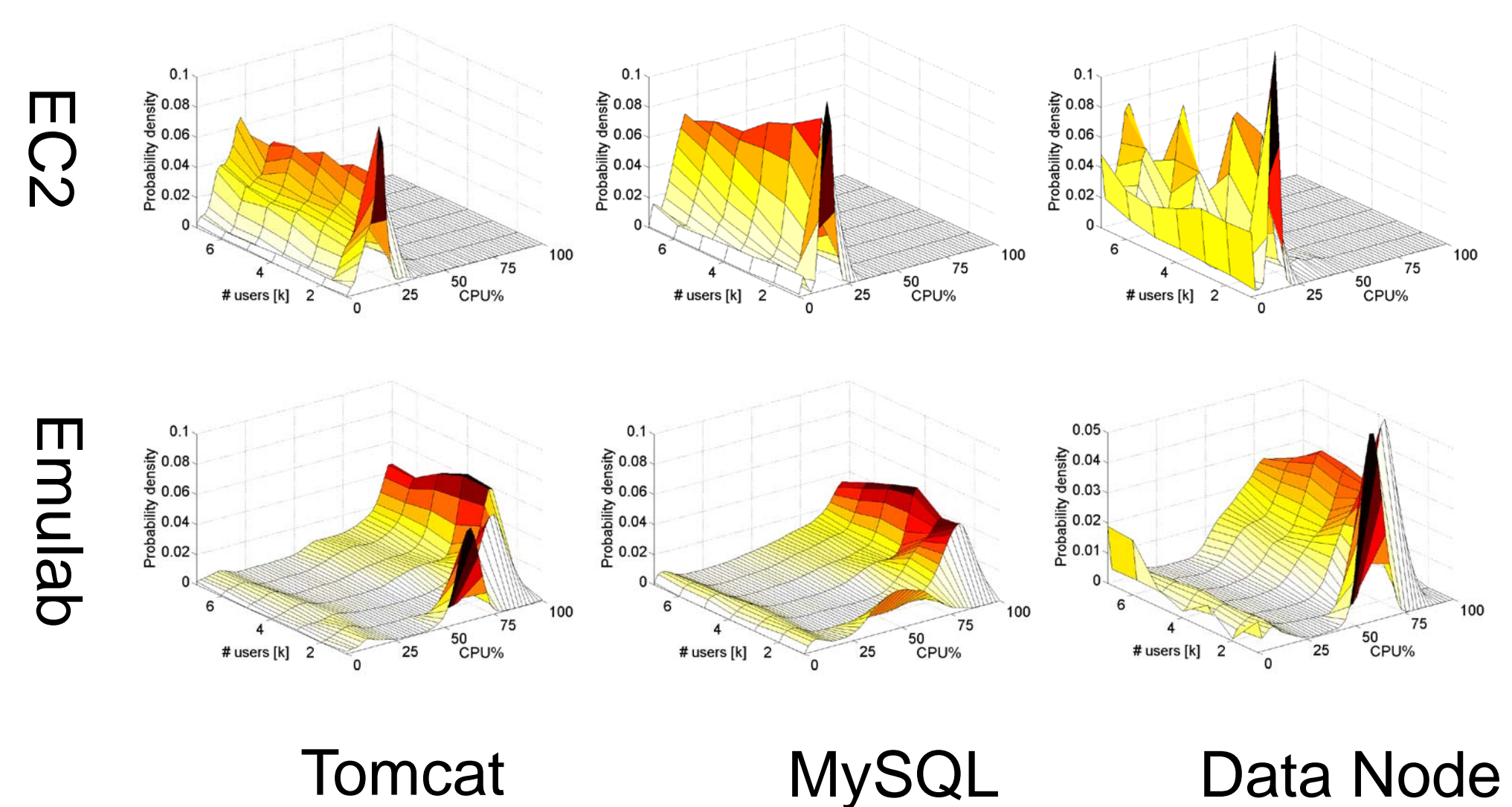


EC2- Horizontal Scalability



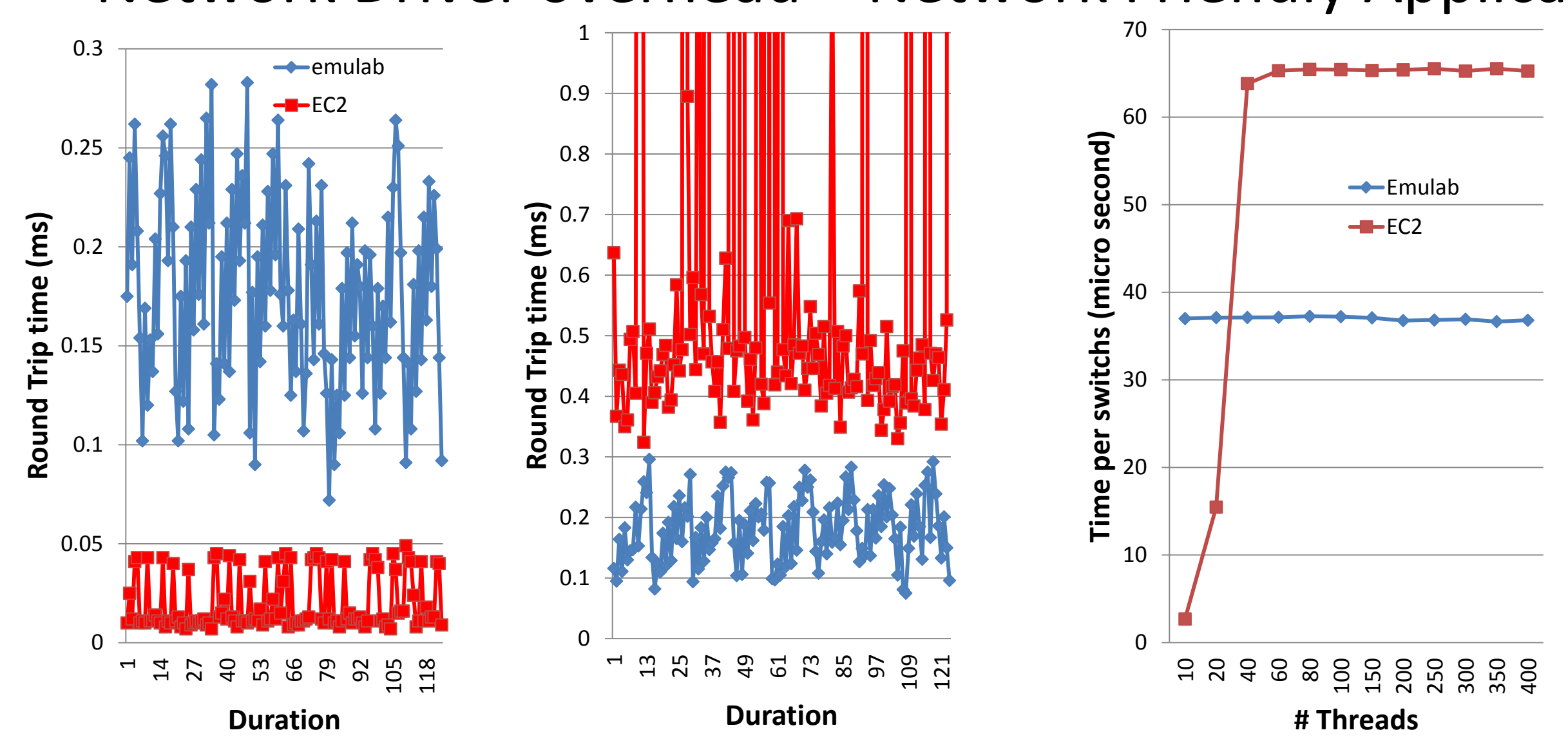
EC2-Vertical Scalability

## RESOURCE UTILIZATION



## ISSUES & SOLUTIONS

- Multi-Threading overhead – Application Rewrite
- Network Driver overhead – Network Friendly Applications



Ping-Pong Test

Context Switching Test

## EXPERIMENT DATA FOR DECISION MAKING

