

***EnaCloud: An Energy-
saving Application Live
Placement Approach for
Cloud Computing
Environments***

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Outline



- Recap on EnaCloud
- Our Analysis of EnaCloud
- Our Observations
- Our Interpretation

Recap on EnaCloud

- EnaCloud was originally designed to address issues regarding high energy consumption for cloud computing services
- It ensures workloads are calculated in a way that reduces the amount of *open boxes* (active server nodes using a Virtual Machine)
- Workloads in cloud services will always arrive or depart dynamically
- EnaCloud ensures higher energy savings as more time elapses

Recap on EnaCloud (cont.)

- EnaCloud defines the *over-precision ratio* as $0 \leq a \leq 1$
- It is mainly used to determine the percentage of additional resources that a workload requires to be allocated
- Also used to verify if $\text{size}'(x)$ is between $(1 - a) * \text{size}(x)$ and $(1 + a) * \text{size}(x)$
- *Over-precision* can result in wasting some resources, but also help achieve energy efficiency at the same time

Our Analysis of EnaCloud

- The algorithm associated with EnaCloud utilizes a live migration exploit that further concentrates workloads
- This exploit will ensure that there is always a tightly concentrated state available at any time
- EnaCloud can guarantee a 10 to 13 percent savings in energy compared to the *first fit* and *best fit* algorithms

Our Observations

- We observed a trend in the energy consumption of application migration using the following data:

Memory (MB)	128	256	512	1024
Energy (J)	202	399	783	1524

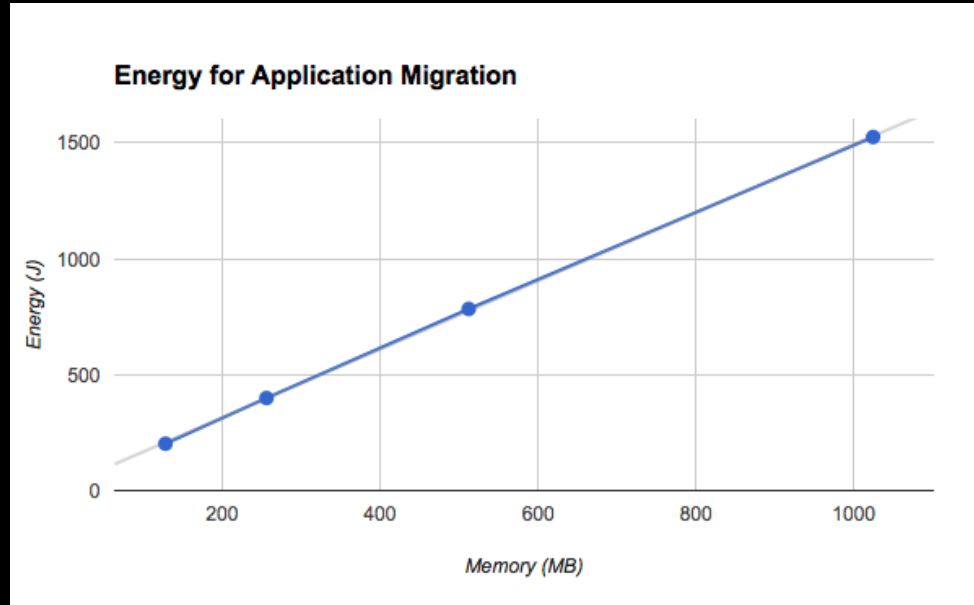
$$202 \text{ J} \div 128 \text{ MB} = 1.578 \text{ J / MB}$$

$$399 \text{ J} \div 256 \text{ MB} = 1.559 \text{ J / MB}$$

$$783 \text{ J} \div 512 \text{ MB} = 1.529 \text{ J / MB}$$

$$1524 \text{ J} \div 1024 \text{ MB} = 1.488 \text{ J / MB}$$

Our Observations (cont.)



- From this observation, we can see that the rate of energy consumption decreases slightly as the amount of data being dealt with increases

Our Interpretation

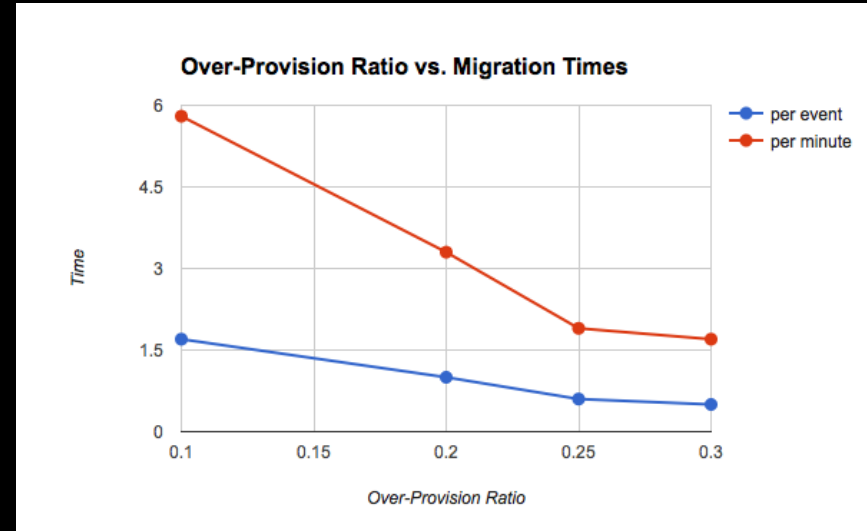
- The *migration* times with respect to *over-provision* ratios were given as follows:

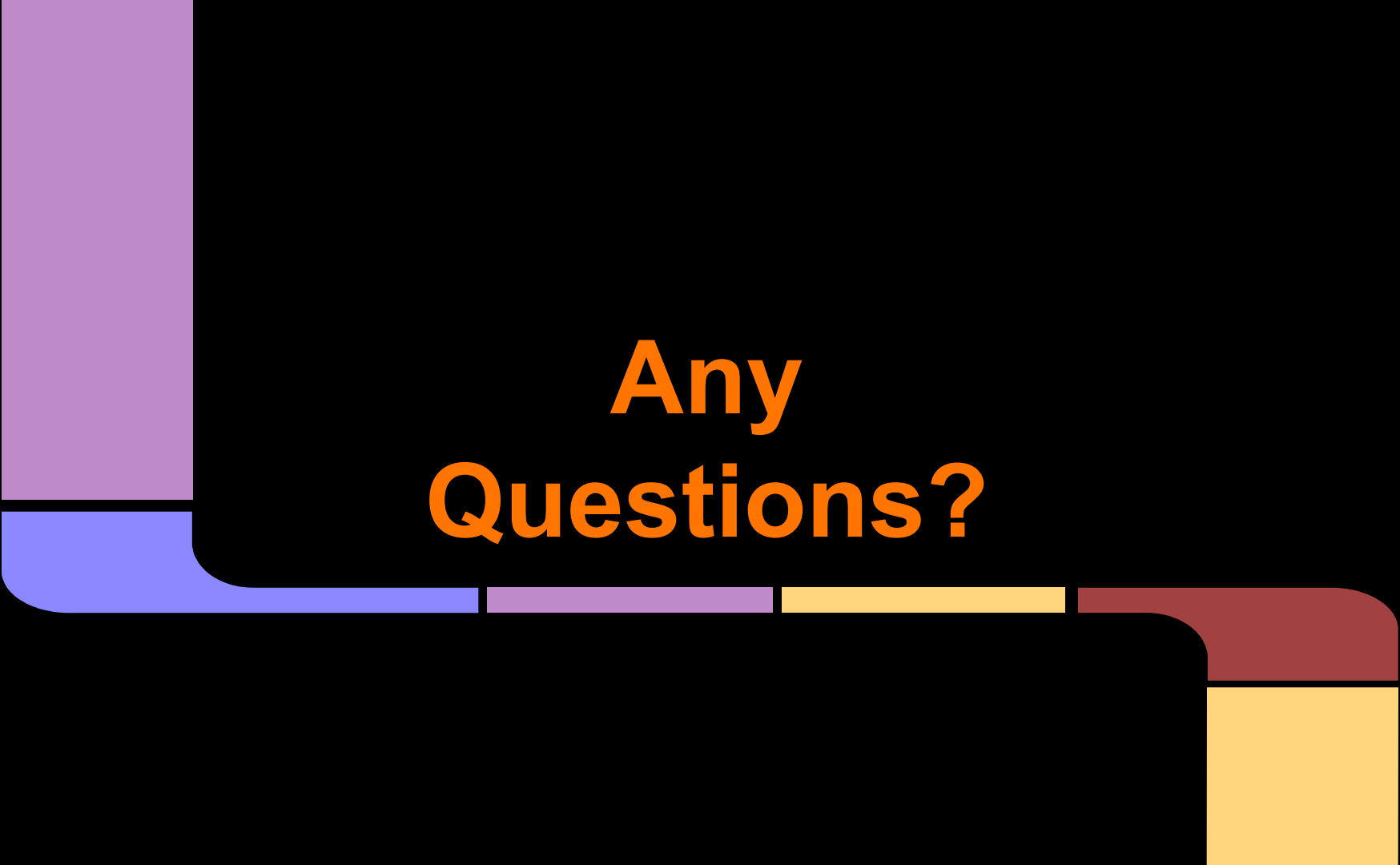
Over-provision ratio	$a = 0.1$	$a = 0.2$	$a = 0.25$	$a = 0.3$
Migration Times				
<i>per event</i>	1.7	1.0	0.6	0.5
<i>per minute</i>	5.8	3.3	1.9	1.7

- From this data, we can see an initial steep decline in migration times, with differences ranging from 0.2 to 2.5 per *minute* and 0.1 to 0.7 per *event*

Our Interpretation (cont.)

- With this chart, we interpret a decrease in migration time as the over-provision ratio increases
- With this, we have reason to conclude that EnaCloud does indeed result in time and energy savings, especially for larger sets of data and information





**Any
Questions?**