A Virtual Machine Repacking in Clouds: Faster Live Migration Algorithms

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SIGCOMM CHICAGO 2014

Projet porté par

Labellisation principale

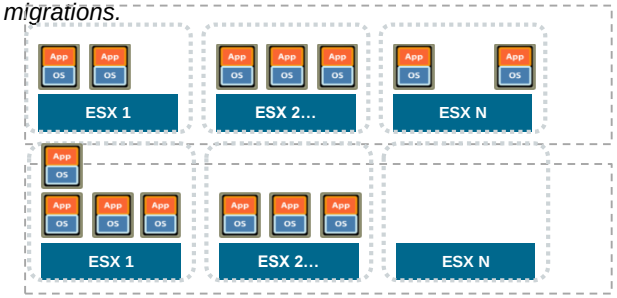
Labellisations secondaires

Soutien de collectivités territoriales

Problem Definition: VMs Repacking in Clouds

VM Placement and Repacking Problem

*Based on allocating and hosting **N VMs** on a physical infrastructure of **M Serveurs**, how to optimally re-place workloads to minimize different infrastructure costs ? Thus, we seek repacking algorithms that **scale well**, minimize **SLA violations**, converge reasonably **fast** and provide the best possible tradeoffs between the number of used servers and migrations.*



Non optimal placement

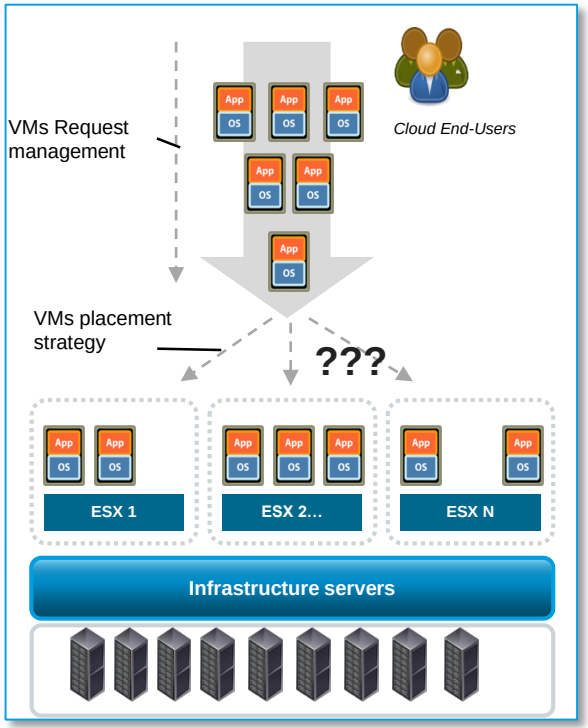
Optimal placement

Benefits

- Resources optimization,
- Minimization of infrastructure costs,
- Energy consumption optimization.

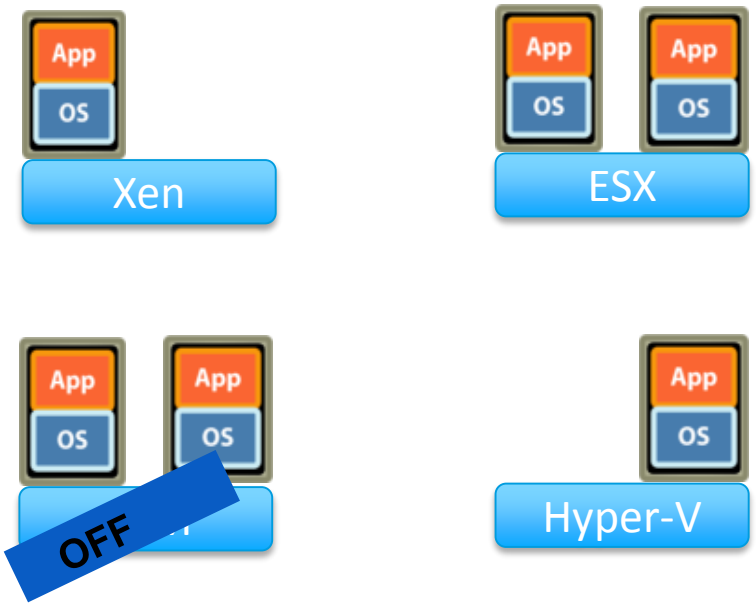
Challenges of the problem:

- *Exponential number of feasible solutions to enumerate.*



Define the best strategy to re-place VMs workloads leading to optimal infrastructure costs.

- **Example of a Repacking Plan:**



Simulation Results: b-Matching vs Bin-Packing Models

$$\text{Min } Z = \sum_{e \in E, e=(i,j)} (H_e + R_e 1_{ij})$$

New Valid Inequalities

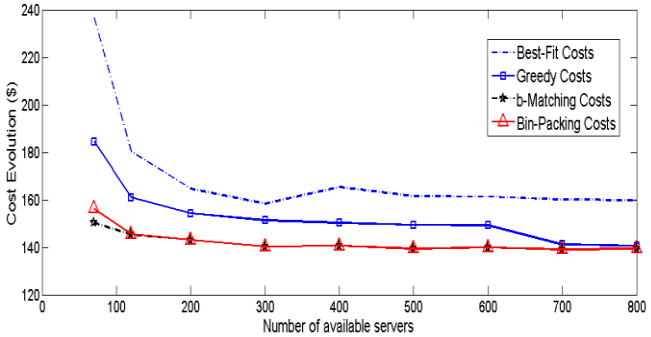
$$\sum_{e \in \delta(v)} x_e = 1$$

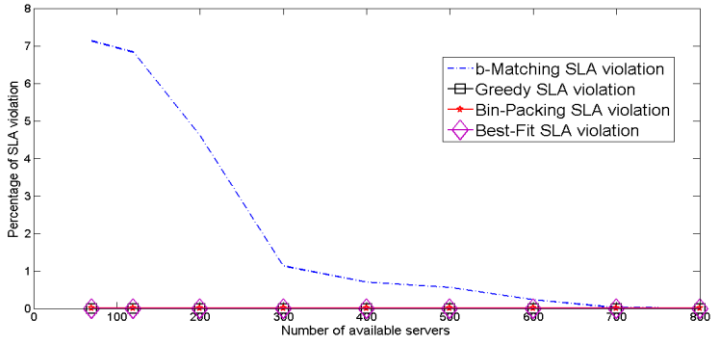
$$\sum_{e \in \delta(v)} x_e \le b(v)$$

$$\sum_{e \in E(G(A))} x_e + x(F) \le \left\lfloor \frac{\sum_{v \in A} b_v + F}{2} \right\rfloor$$

$$x_e \in R$$

|V|	|S|	b-Matching Time (sec)	Bin-Packing Time (sec)
1000	400	0.5	4.2
2000	700	2.0	36.0
3000	900	3.2	> 4H






Thank you