A Virtual Machine Repacking in Clouds: Faster Live Migration Algorithms

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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.

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:

- Xen
- ESX
- Hyper-V
Simulation Results: b-Matching vs Bin-Packing Models

Min \[ Z = \sum_{e \in E, e=(i, j)} (H_e + R_{ij} \cdot 1_{ij}) \]

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

\[ \sum_{e \in \delta(v)} x_e \leq b(v) \]

\[ \sum_{e \in E(G(A))} x_e + x(F) \leq \left[ \sum_{v \in A} b_v + F \right] / 2 \]

\[ x_e \in R \]

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<th>b-Matching</th>
<th>Bin-Packing</th>
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<tr>
<td>(</td>
<td>V</td>
<td>)</td>
</tr>
<tr>
<td>1000</td>
<td>400</td>
<td>0.5</td>
</tr>
<tr>
<td>2000</td>
<td>700</td>
<td>2.0</td>
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<tr>
<td>3000</td>
<td>900</td>
<td>3.2</td>
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Thank you