A Software Tool for Dependability and Cost Evaluation of Private Cloud Infrastructures

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Context

- Cloud Computing Infrastructure Planning
- How do we get better solutions amongst a large combination of cloud infrastructure components?
- Combined values: component types and redundancy
- Decision factors: dependability and cost

Objective

Development of a software tool with the purpose to conceive and evaluate private cloud computing environments considering cost, and dependability aspects

Specific Objectives

- Suggest solutions for cloud infrastructure arrangement considering dependability and cost constraints
- Present an efficient methodology for modeling of cloud components representation

Context

Component Types (Eucalyptus-based IaaS)

- Cloud Controller (CLC)
- Cluster Controller (CC)
- Node Controller (NC)
- Virtual Machine (VM)
- Network Switch (SW)
- Router (RTR)

Context

Redundancy Types

- Active - Passive
  - Hot-Standby
  - Cold-Standby
  - Warm-Standby
- Active - Active
  - N + 1
- No Redundancy

Restrictions

User-based definitions of constrains for classification of solutions

- Cost value (US$)
- Availability rate (%)

Model Generation

- Greedy Randomized Adaptive Search Procedure

  (Resende & Ribeiro, 2002)
- Comprises
  - Construction phase
  - Local search phase

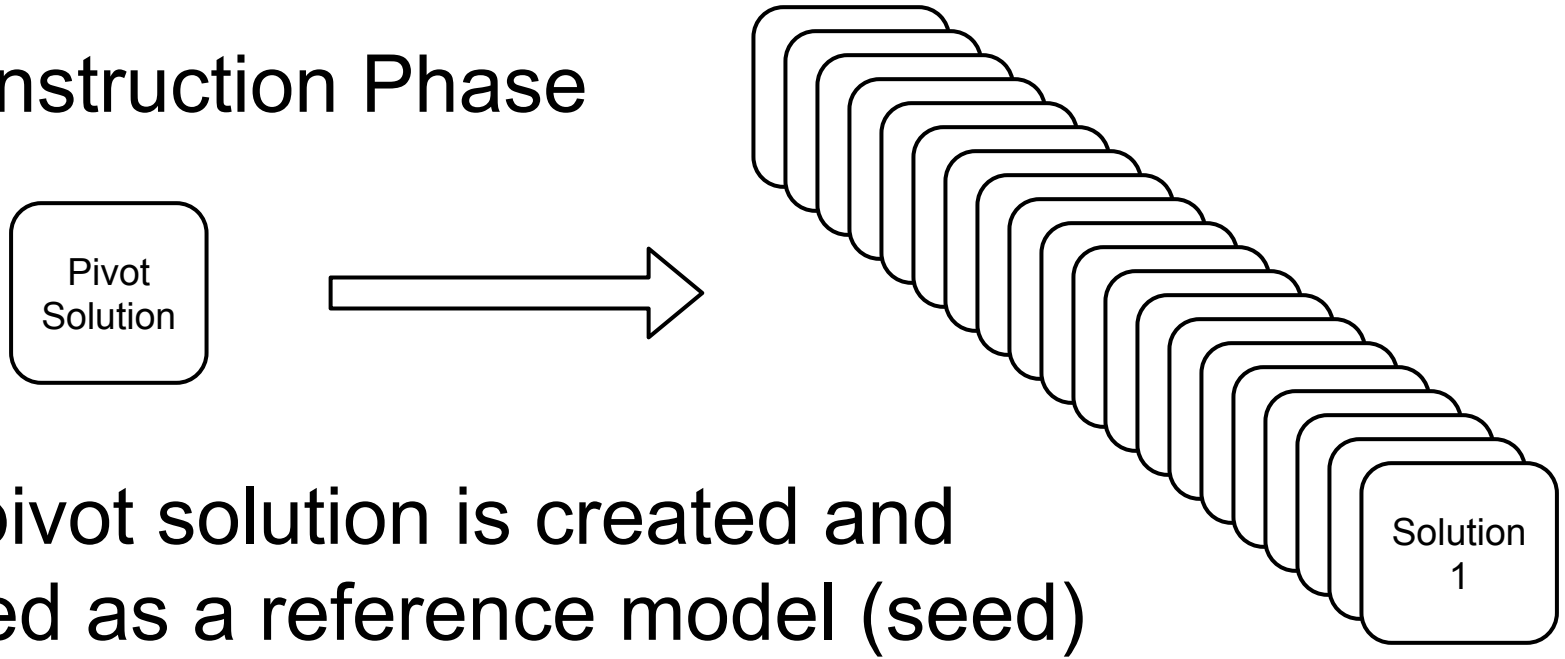
Model Generation

- Our algorithm is an adaptation for the original GRASP metaheuristic definition

```
procedure GRASP(Max_Iterations,Seed)
1     Read_Input();
2     for k = 1,...,Max_Iterations do
3          Solution ← Greedy_Randomized_Construction(Seed);
4          Solution ← Local_Search(Solution);
5          Update_Solution(Solution,Best_Solution);
6     end;
7     return Best_Solution;
end GRASP.
```

Model Generation

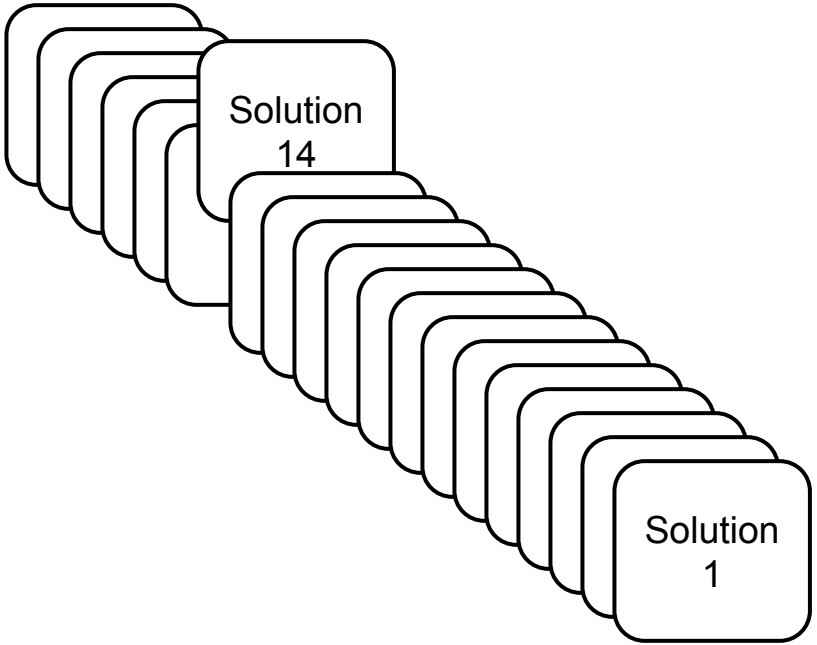
Construction Phase

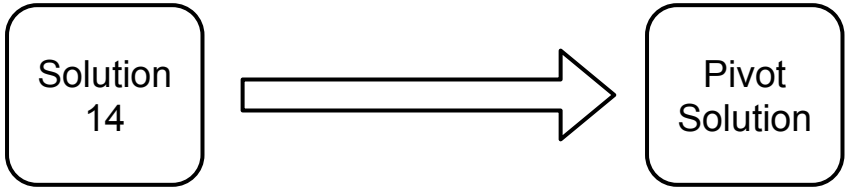


A pivot solution is created and
used as a reference model (seed)
for the construction of the solution set

Model Generation

Local Search Phase





Picks the best solution on a defined criteria and sets it up as a new seed

Algorithm

- In the end of a local search, the algorithm provides a optimized solution set
- Restricted Candidate List
- Performing this procedure for a maximum number of iterations will yield a “elite” solution set
- That’s what we want

DCM4PCIP's Case Study

- Dependability and Cost Modeling for Private Cloud Infrastructure Planning
- Developed using Java Platform
- Uses Mercury Tool
  - Model Generation API
  - Stationary simulation for availability metric computation

Communication Workflow