RMORM: A framework of Multi-objective Optimization Resource Management in Clouds

Wenyun Dai, Haopeng Chen, Wenting Wang, Xi Chen

Wenyun Dai

REINS Group

School of Software

Shanghai Jiao Tong University

Shanghai, P.R. China

INTRODUCTION

What clients care most ?

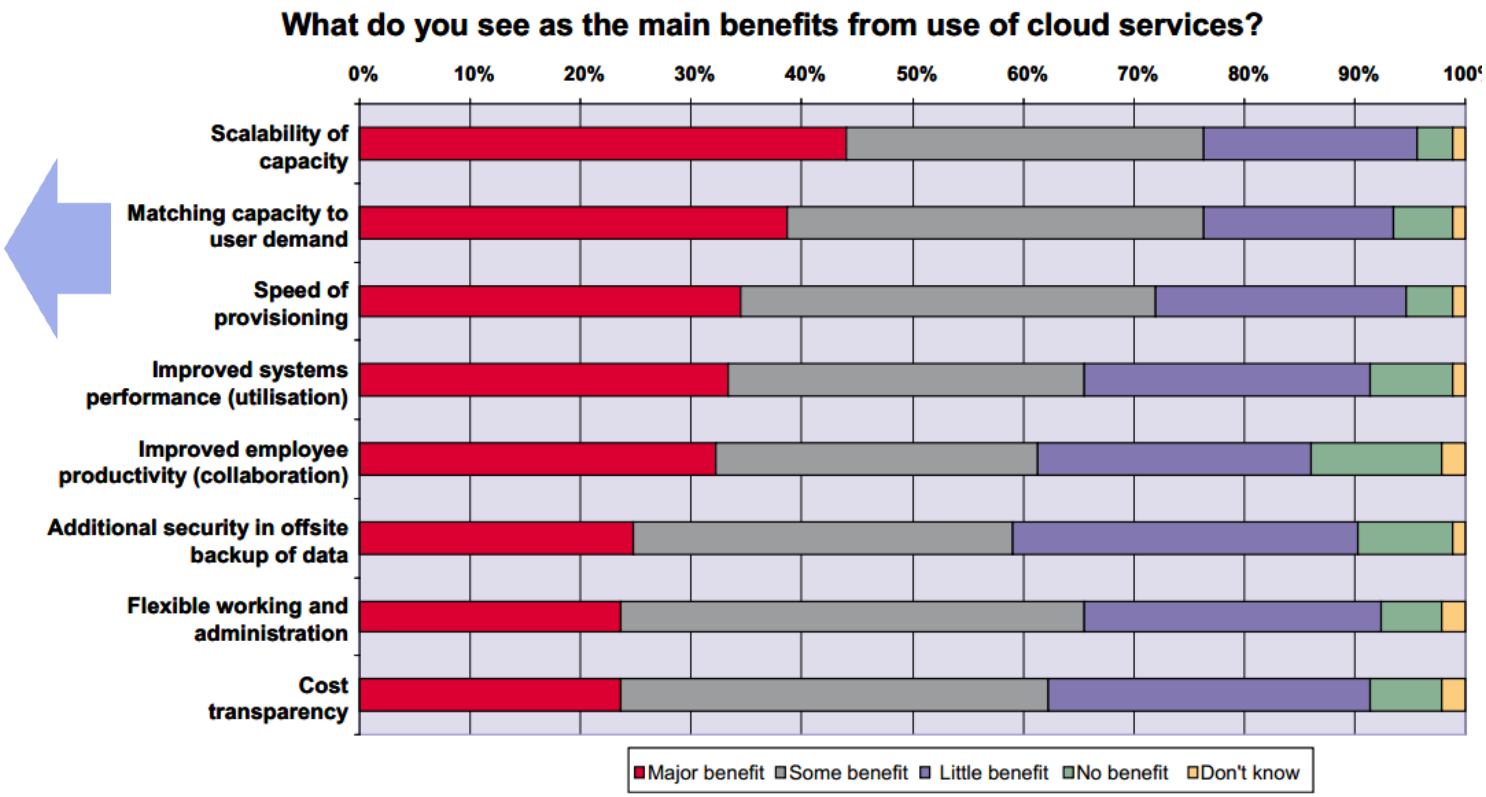
Scalability

SLA

Performance

Backup

Flexibility

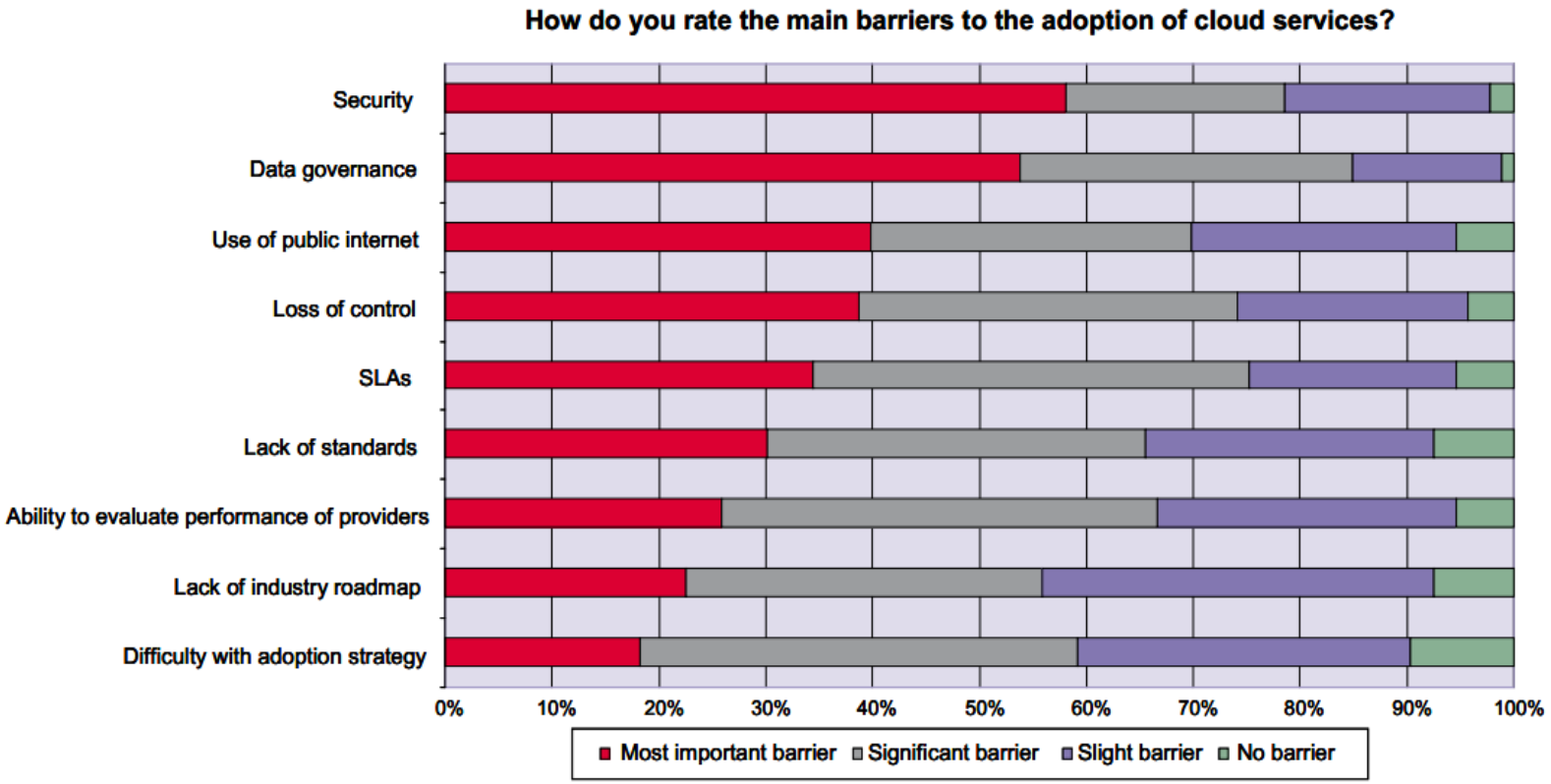


Source: Ovum

OVUM

INTRODUCTION

What clients care most ?



Source: Ovum

OVUM

INTRODUCTION

What providers offer ?

SLA
- Service Guarantee
- Service Credit
- Service Granularity
- OS/Software Patches
- Service Violation

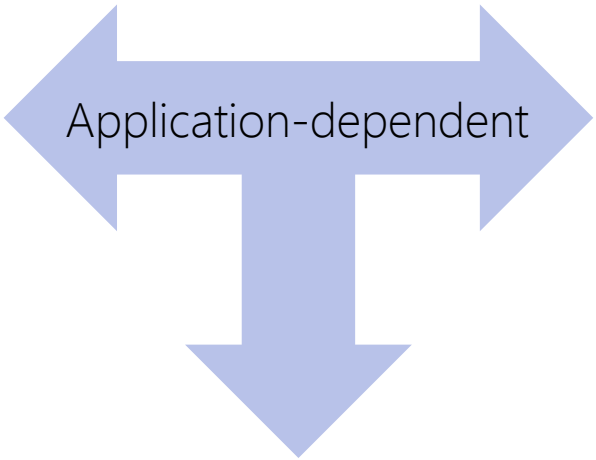
Guarantee about Scalability, Availability and Reliability

INTRODUCTION

Why we did our research?

Providers

High Cost



Clients

Lack of Professional Ability

We

Multi-objective optimal resource management

DESIGN PRINCIPLE

Performance

Providers

Can not offer

Clients

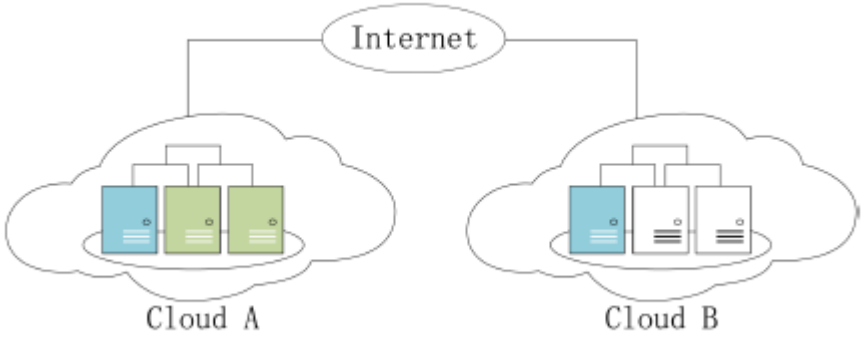
Care most

What affects the Performance ?

Amount of Resources

+

Distance between VMs



DESIGN PRINCIPLE

Performance

Availability

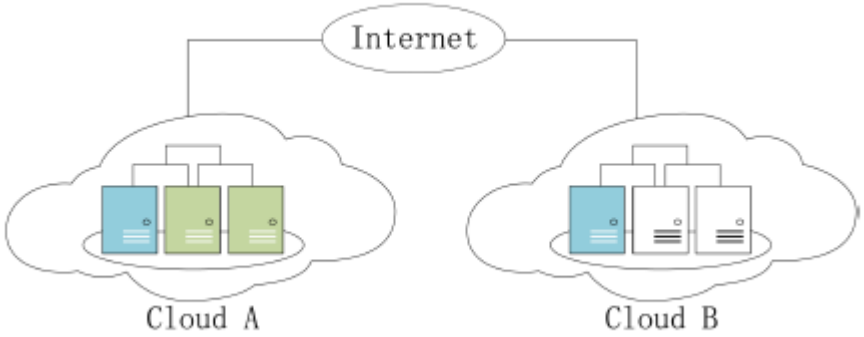
Cost

Multi-Objective

Amount of Resources

+

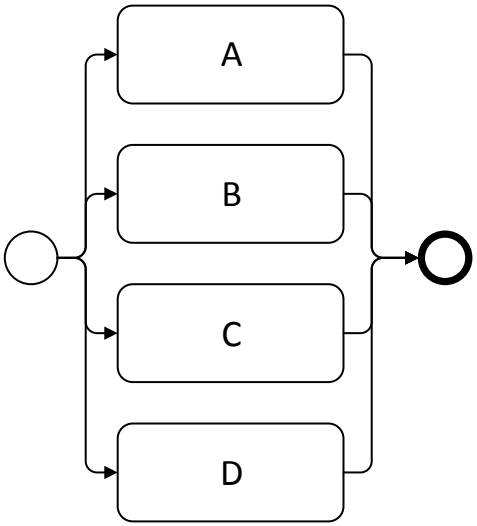
Distance between VMs



DESIGN PRINCIPLE

Three basic means

Parallel Optimization

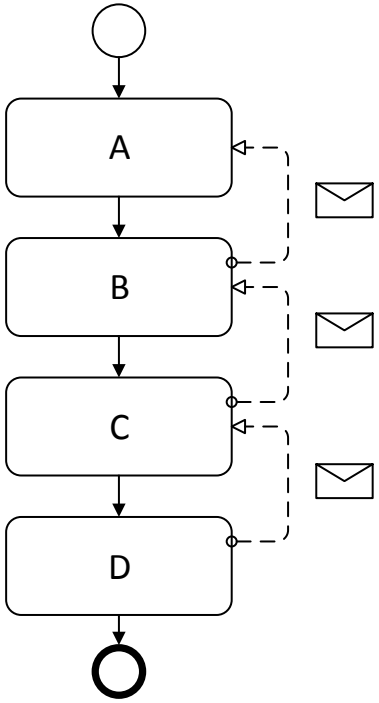


DESIGN PRINCIPLE

Three basic means

Parallel Optimization

With Feedback Loop



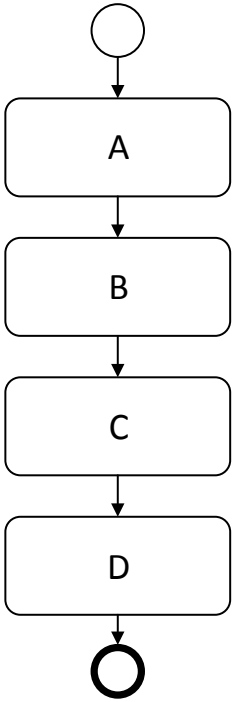
DESIGN PRINCIPLE

Three basic means

Parallel Optimization

With Feedback Loop

Serial Optimization



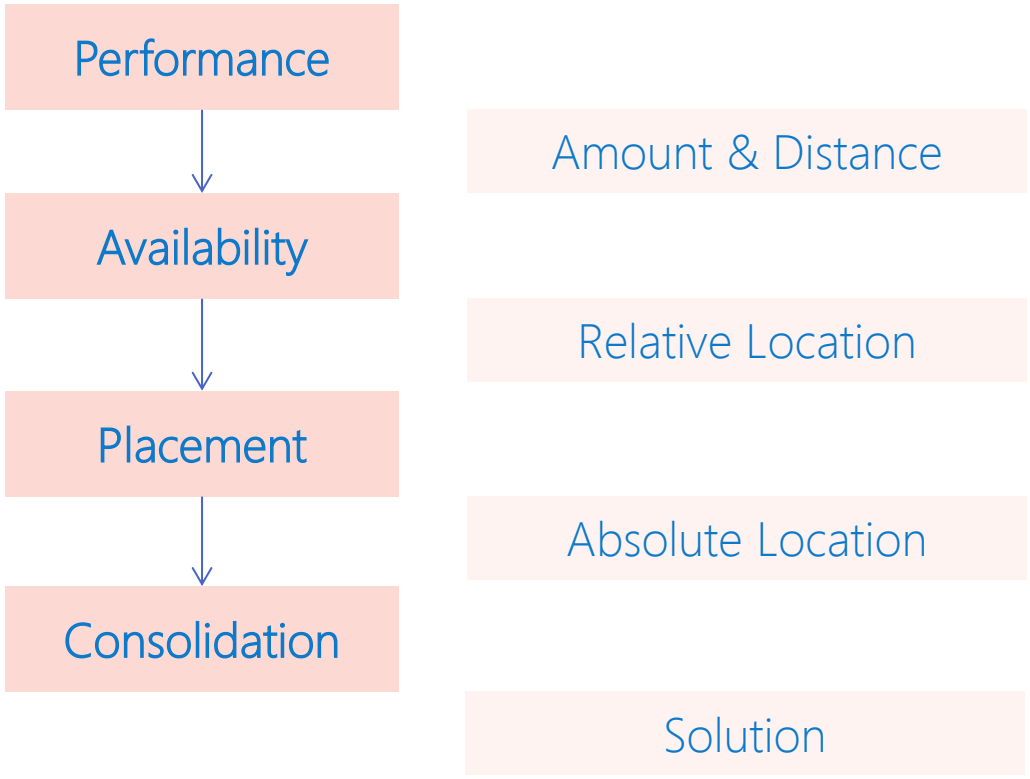
DESIGN PRINCIPLE

Three basic means

Type	Complexity	Cost	Solution	Expandability
Parallel Optimization	Very complicated	Very High	Optimal in theory	Low
With Feedback Loop	Normal	Maybe Very High	Maybe no result, optimal if found	Low
Serial Optimization	Easy	Low	Not optimal	High

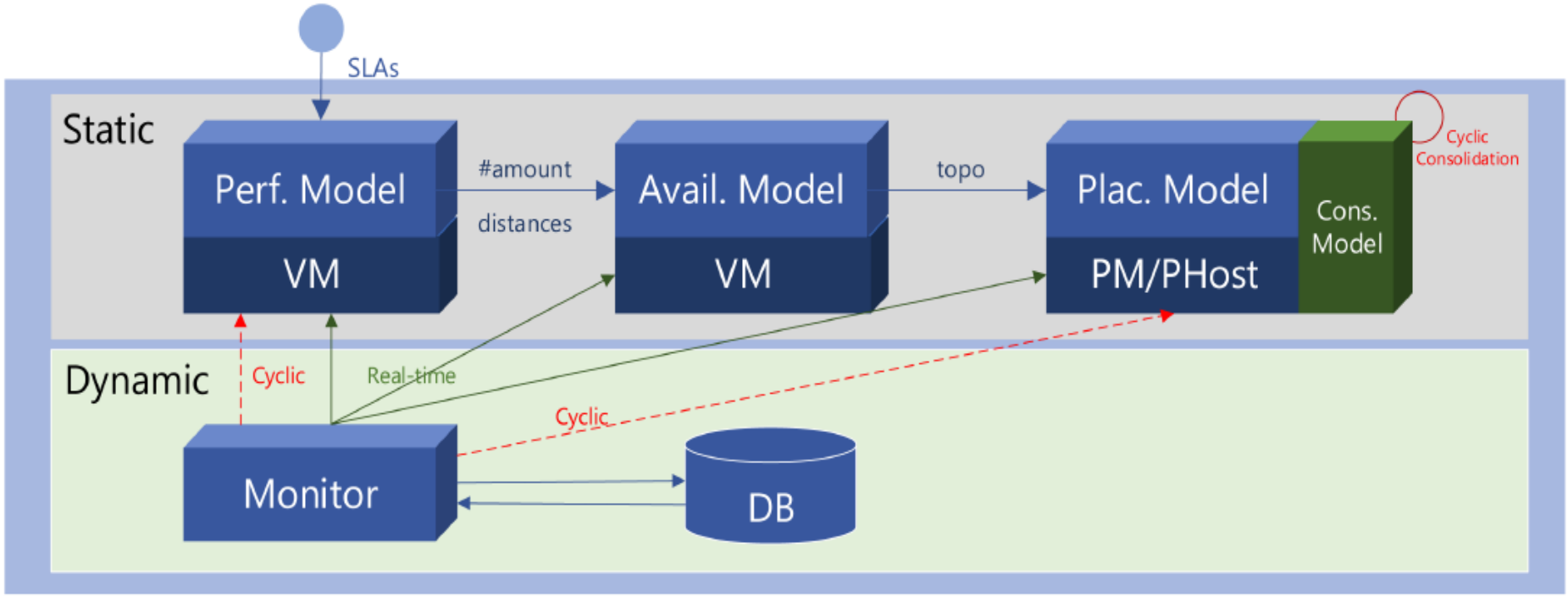
DESIGN PRINCIPLE

Serial Optimization with Priority Level



MECHANISM

Architecture

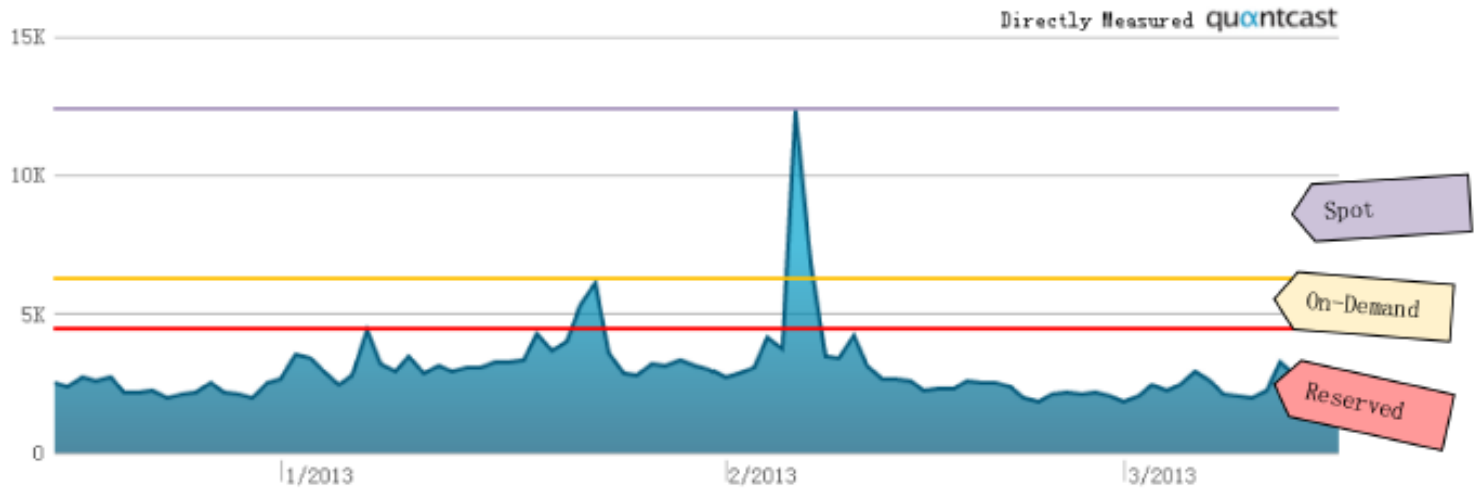


MECHANISM

Performance Model

Example

Using Amazon EC2

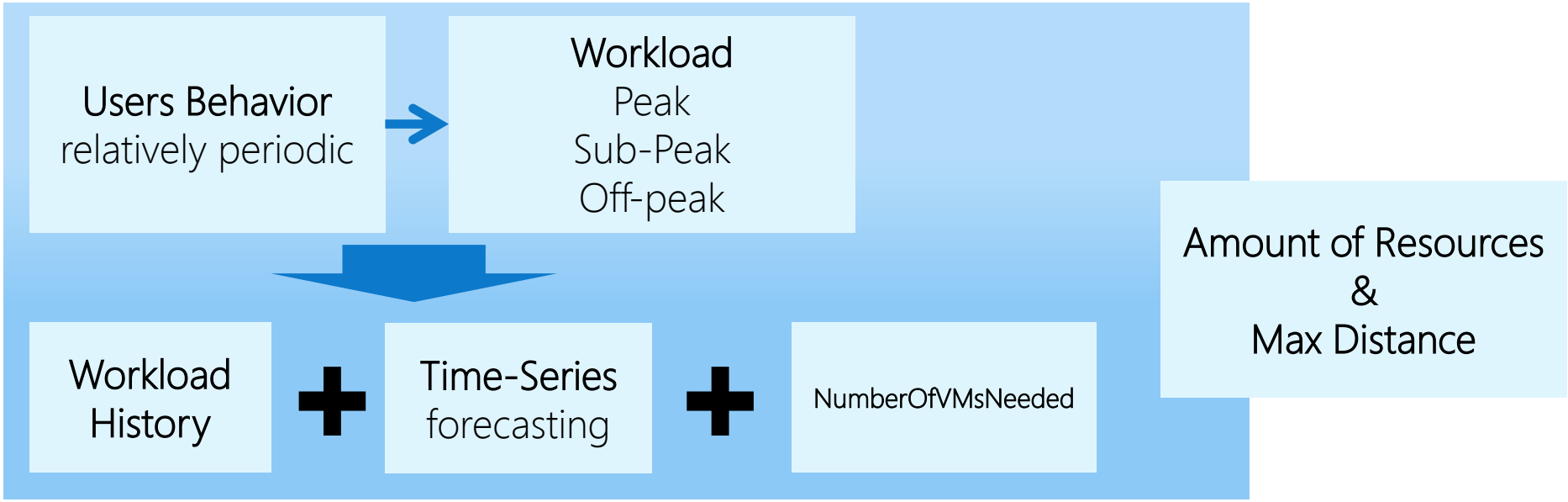


MECHANISM

Performance Model

Main Idea

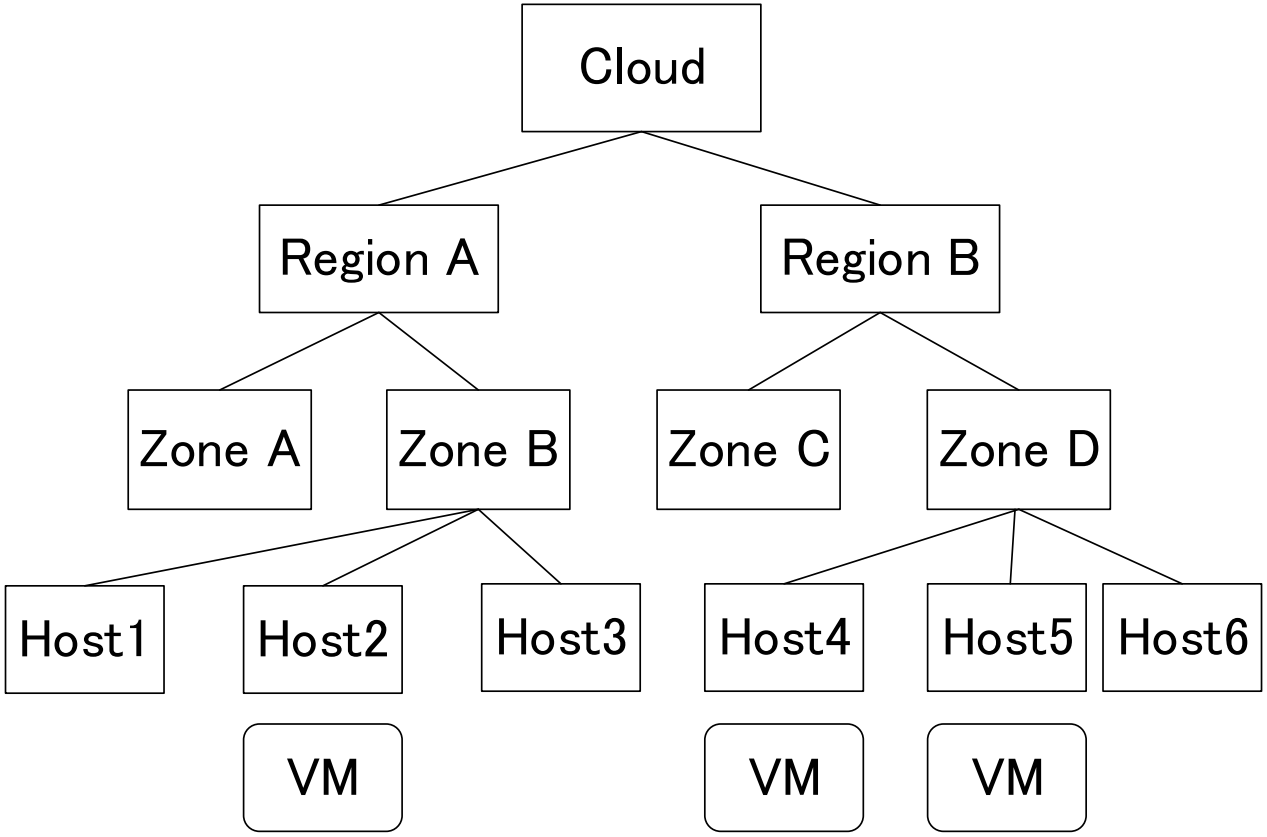
Workload Prediction



MECHANISM

Availability

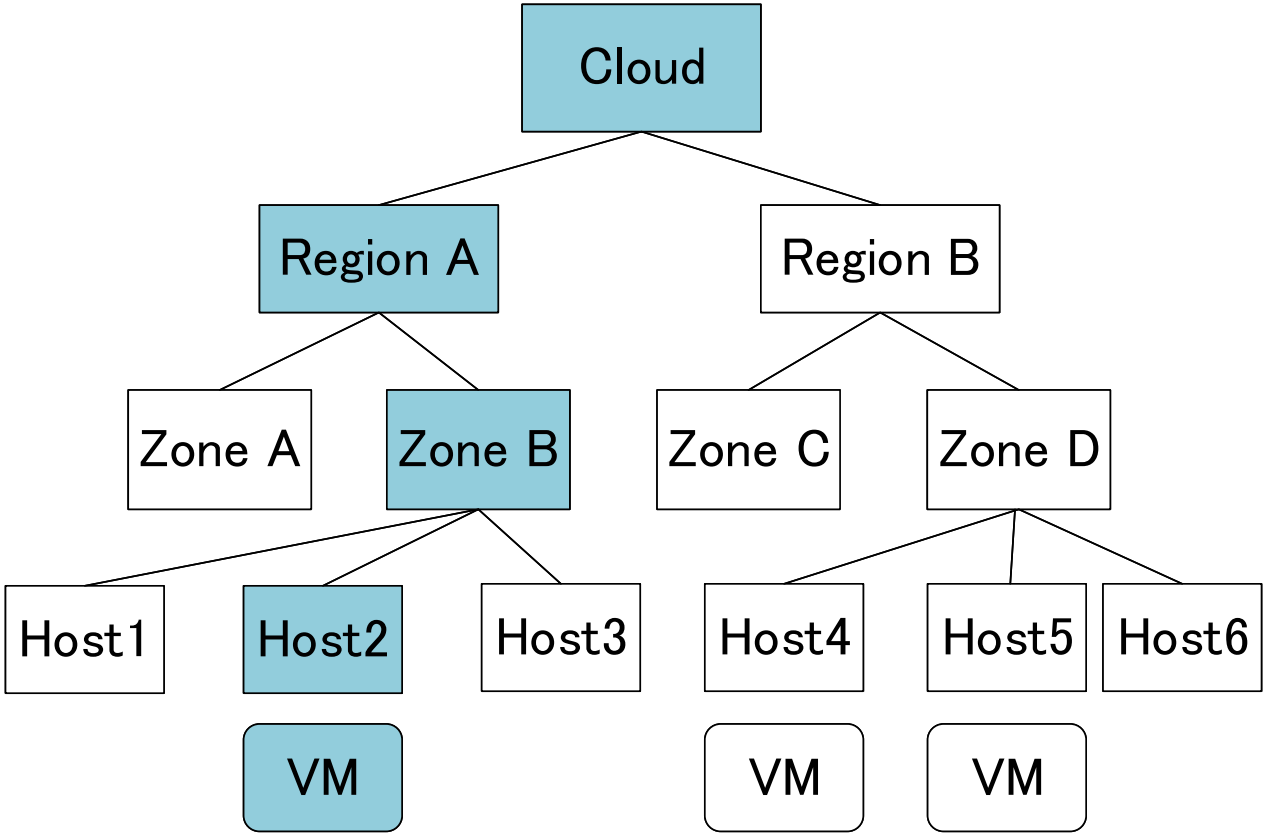
Main Task
Relative Location



MECHANISM

Availability

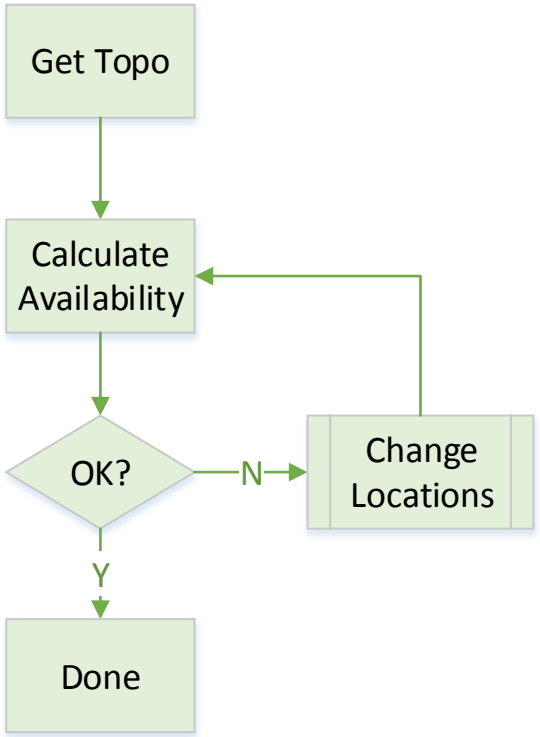
Main Task
Relative Location



MECHANISM

Availability

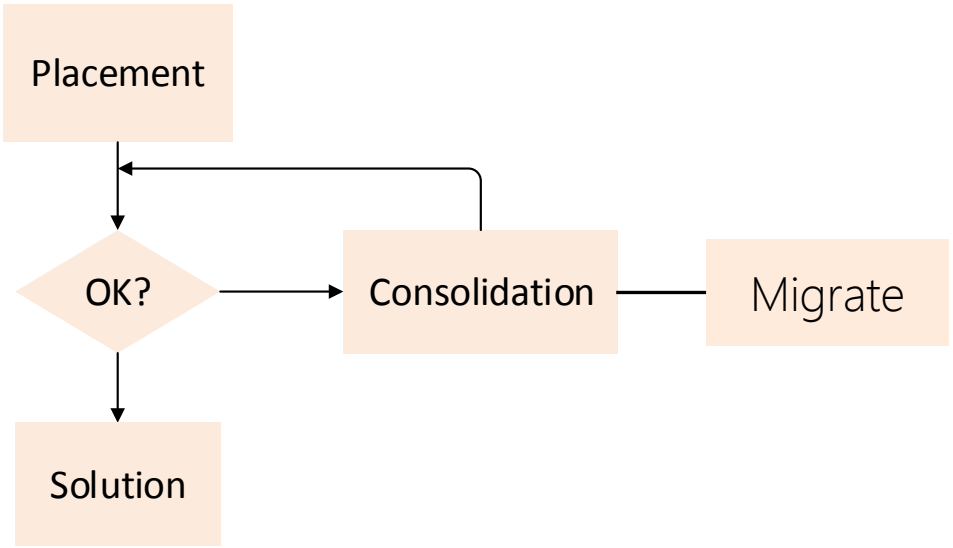
Main Task
Relative Location



MECHANISM

Placement & Consolidation Model

Main Task
Placing VMs into PHs & Consolidation



MECHANISM

Monitor

Main Task
Monitoring, Pretreating & Operating DB

Real-Time

For VM
- CPU Utilization
- Memory Utilization
- Swap Utilization

Periodic

For PH
- CPU Utilization
- Memory Utilization
- I/O Utilization
- Disk Space Utilization

OSGi

Main Task
Expandability & Variability

THANKS

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