# Towards Win-win: Multi-objective Constrained Resource Management in Cloud Federation

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# INTRODUCTION

Federation of Public Clouds

- Diversity of Public Clouds
  - Given more choices to deploy applications.

➢ Gain independence of cloud providers & Improve availability

➢ Multi-tier → Different Clouds for best quality

# INTRODUCTION

Federation of Private and Public Clouds

- Development of Private Clouds

➢ Scale up Computing Power

➢ Improve Resource Utilization

# INTRODUCTION

Our Job

- Customers
  - Performance & Availability
- Providers
  - Power Saving

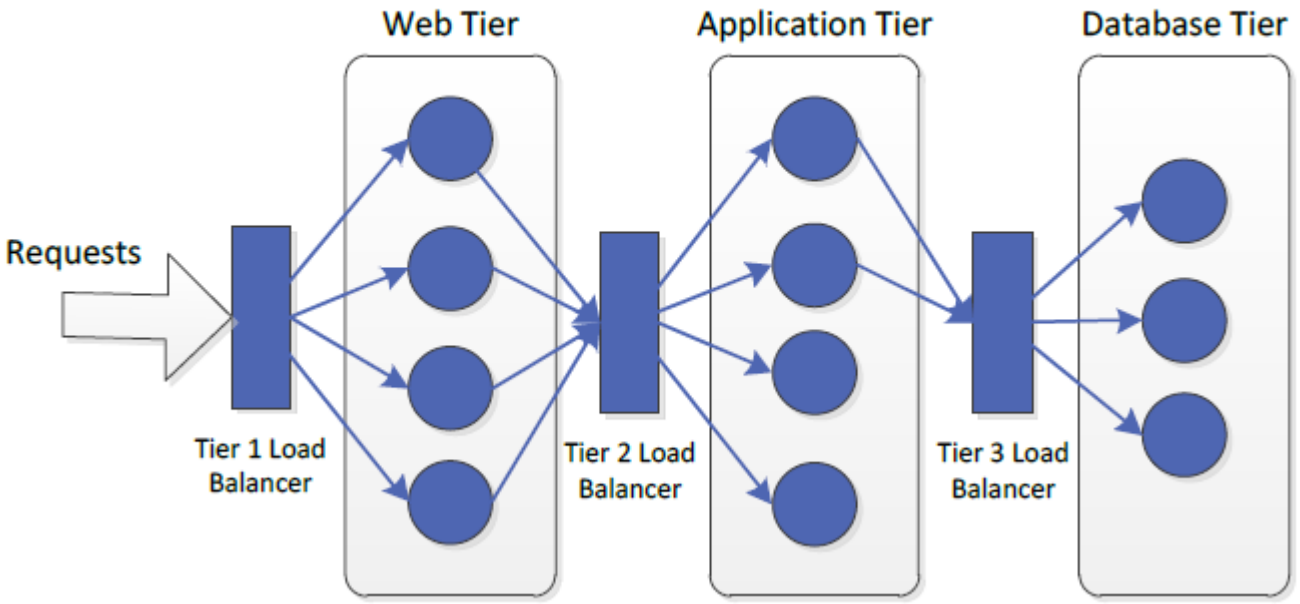
➢ Analyze the objectives for building Cloud Federation

➢ Put forward a design of multi-objective constrained resource management

# OBJECTIVES

Types of Cloud Federations

Architecture of Typical Multi-tier Applications



# OBJECTIVES

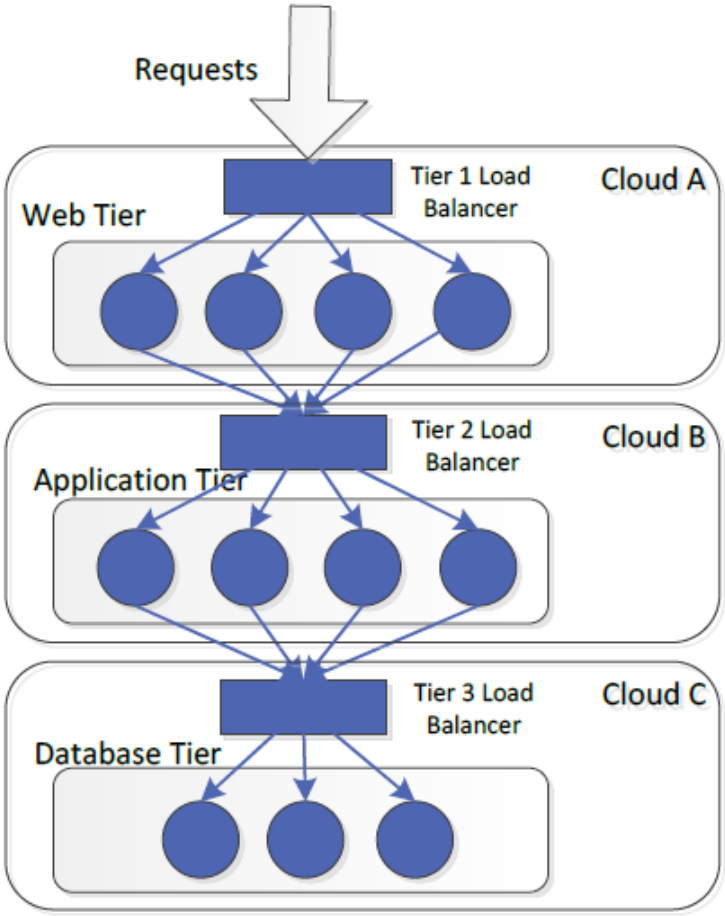
## Types of Cloud Federations

### Vertical Cloud Federation

Each cloud provides hosting environment for only one tier

Collaboration between clouds

Determined by quality of services



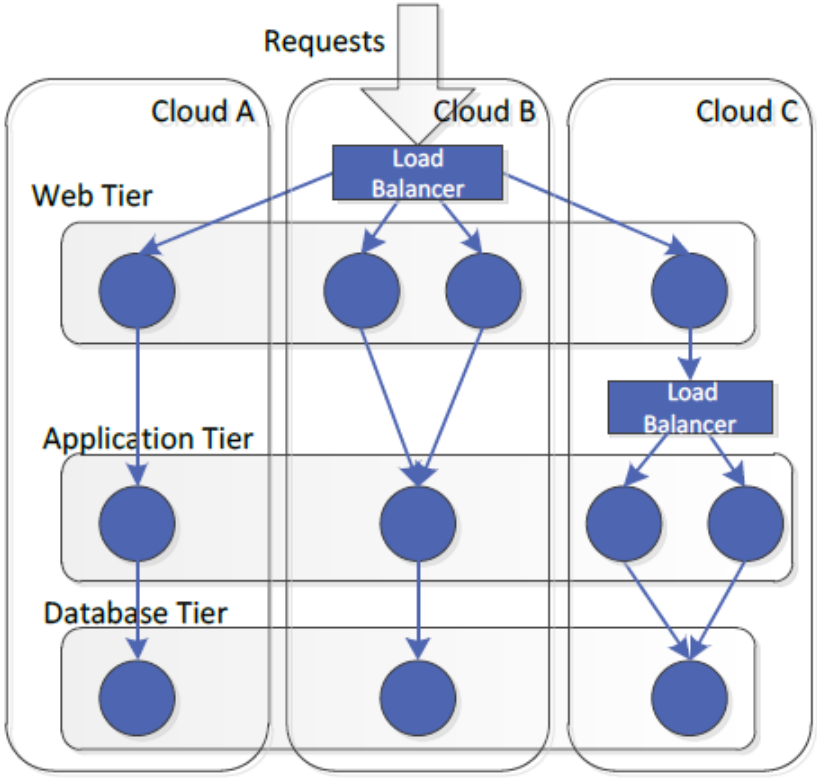
# OBJECTIVES

## Types of Cloud Federations

### Horizontal Cloud Federation

Deploy multiple instances into an integration of resources from multiple clouds

Reduce the failure probability

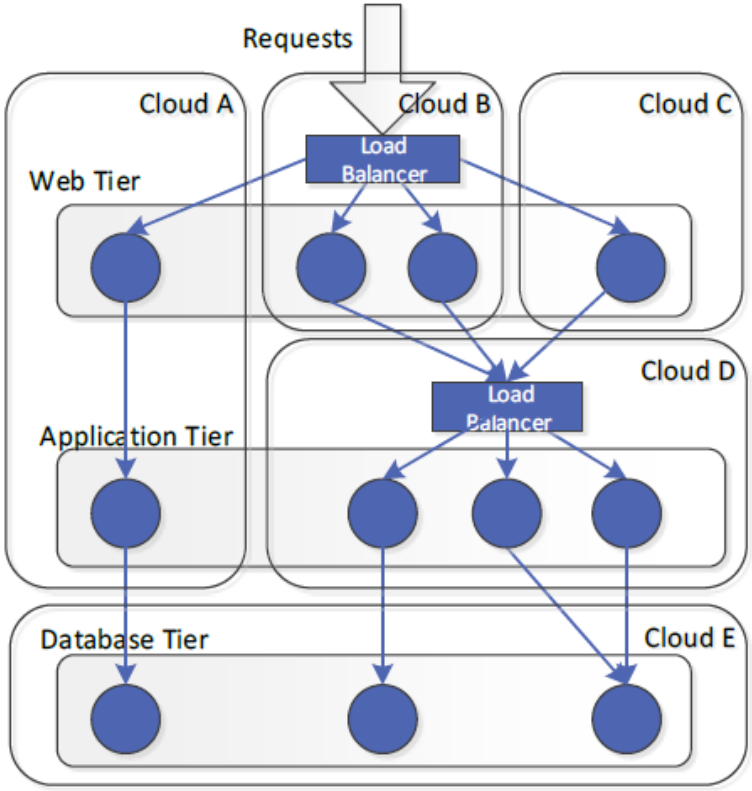


# OBJECTIVES

## Types of Cloud Federations

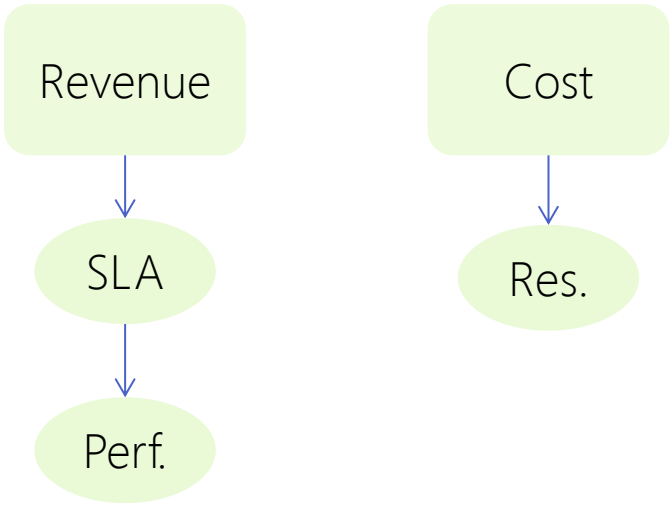
### Hybrid Cloud Federation

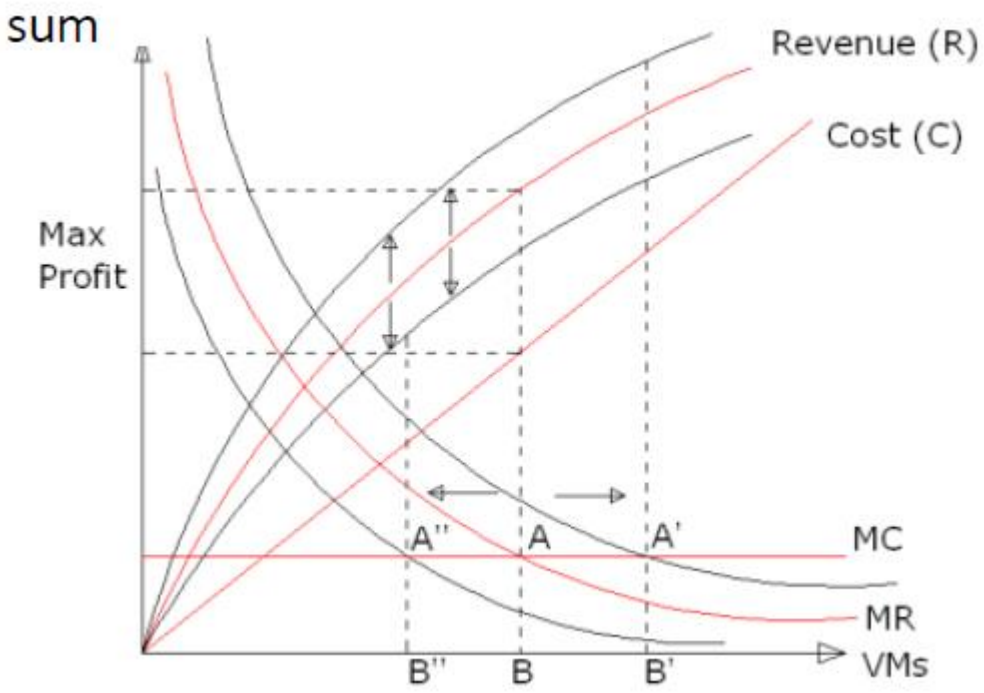
Combination of vertical and horizontal cloud federations



# OBJECTIVES

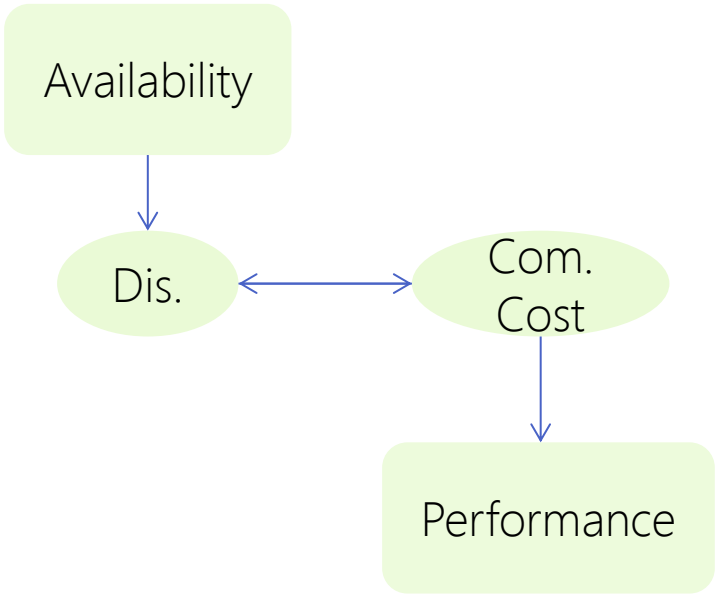
Profit-driven Resource Provisioning

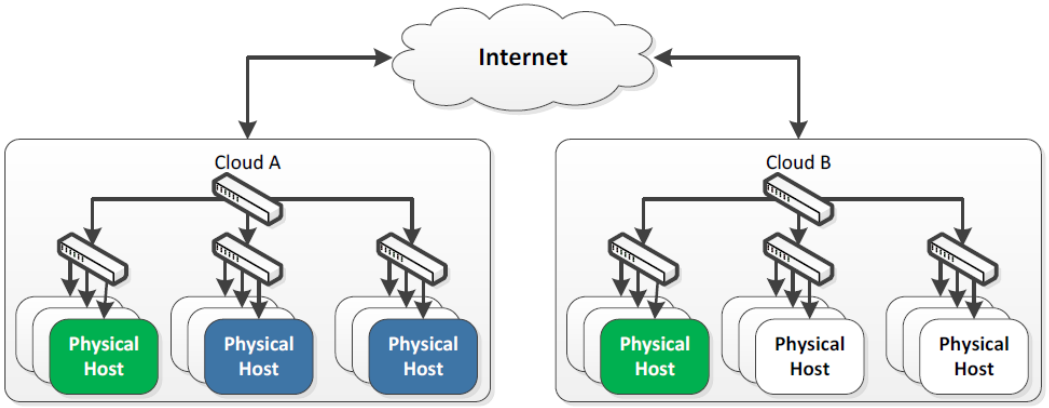


# OBJECTIVES

## Availability-aware Resource Placement

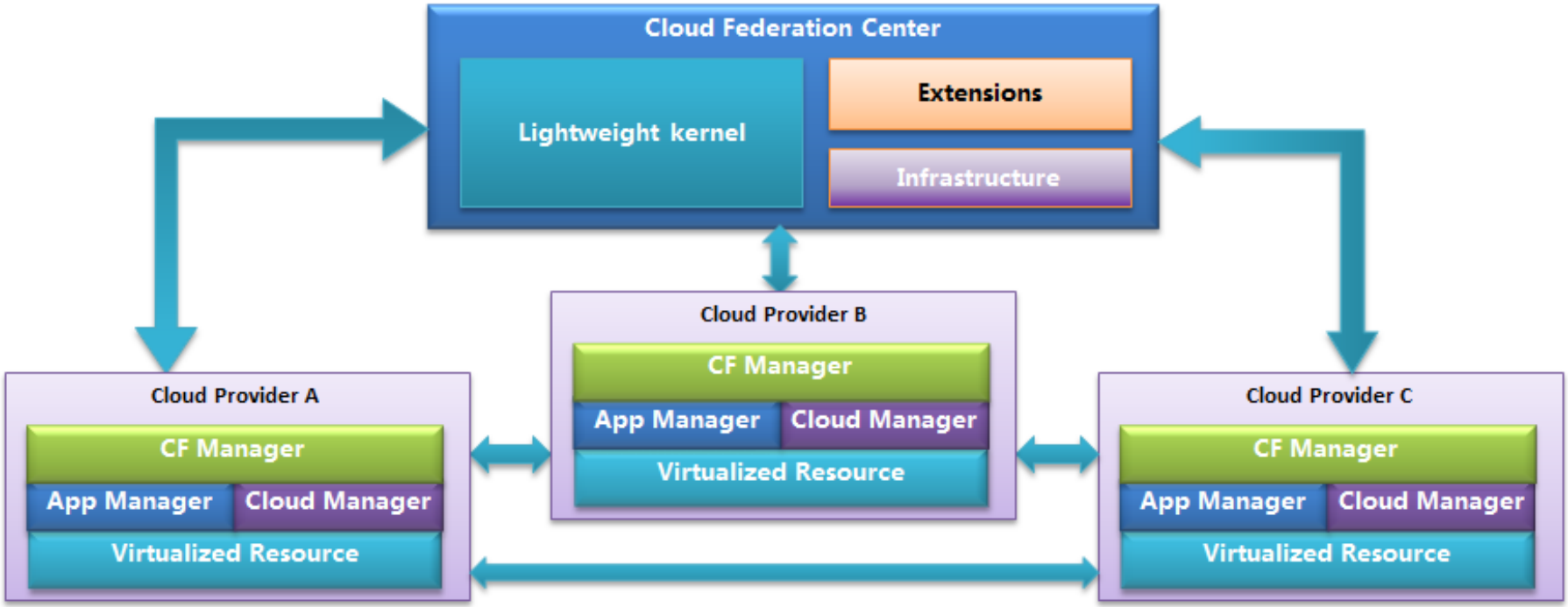



Acceptable Range

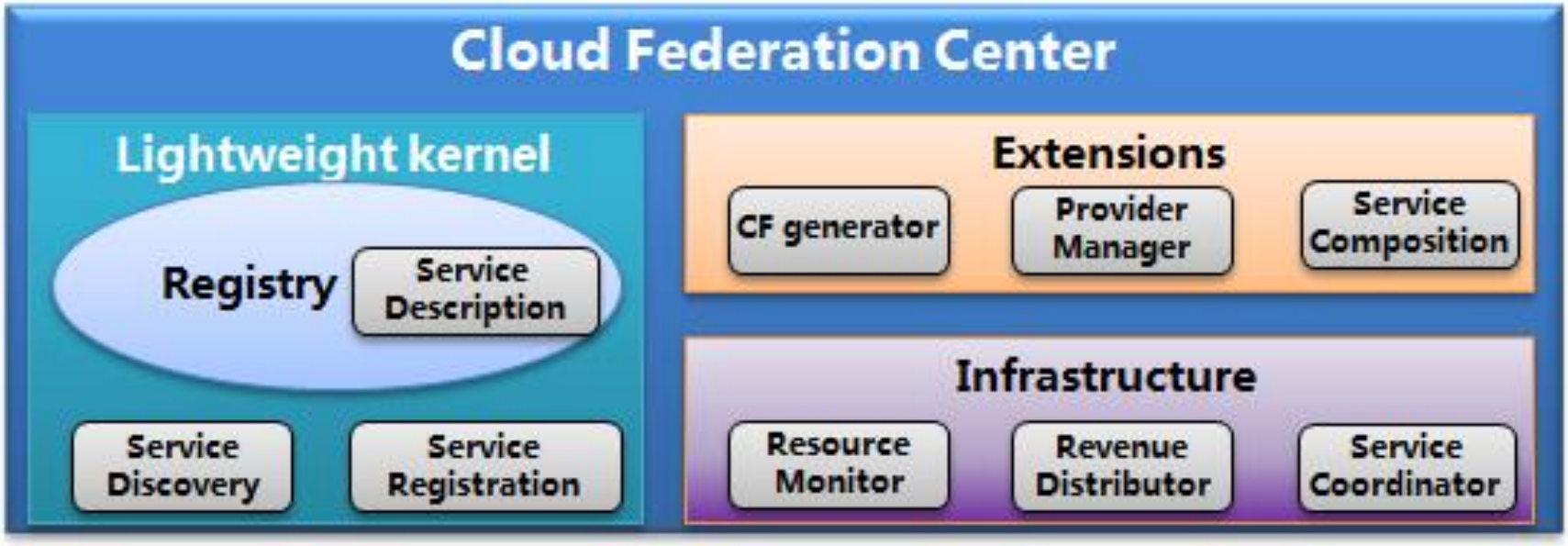
# DESIGN

The Architecture of Cloud Federation



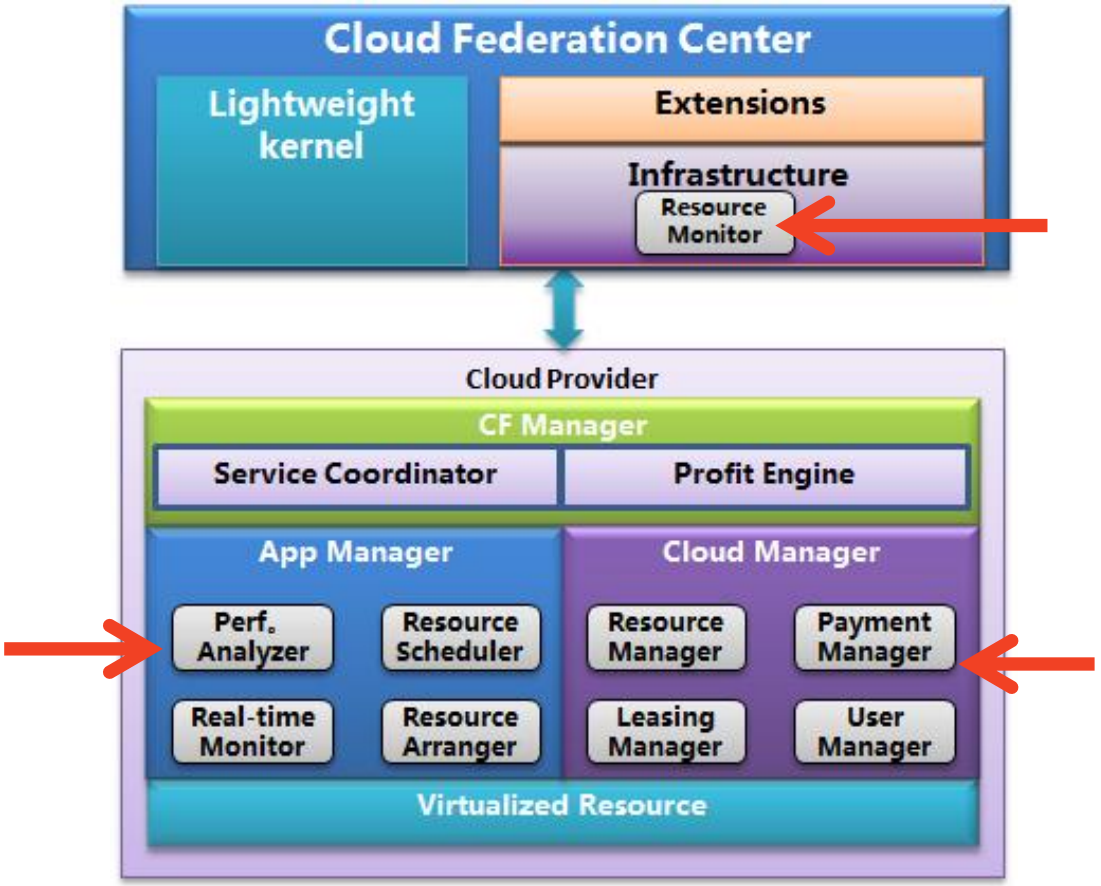
# DESIGN

The Cloud Federation Center



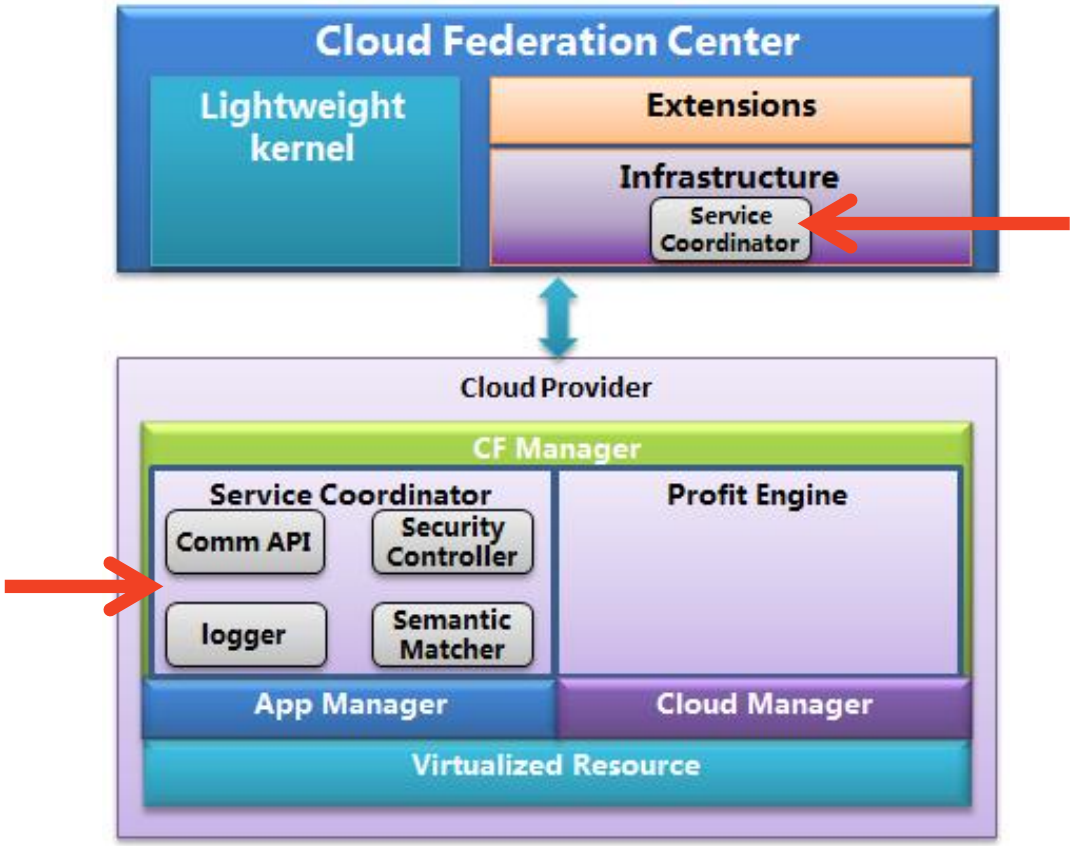
# DESIGN

Dynamic Resource Management



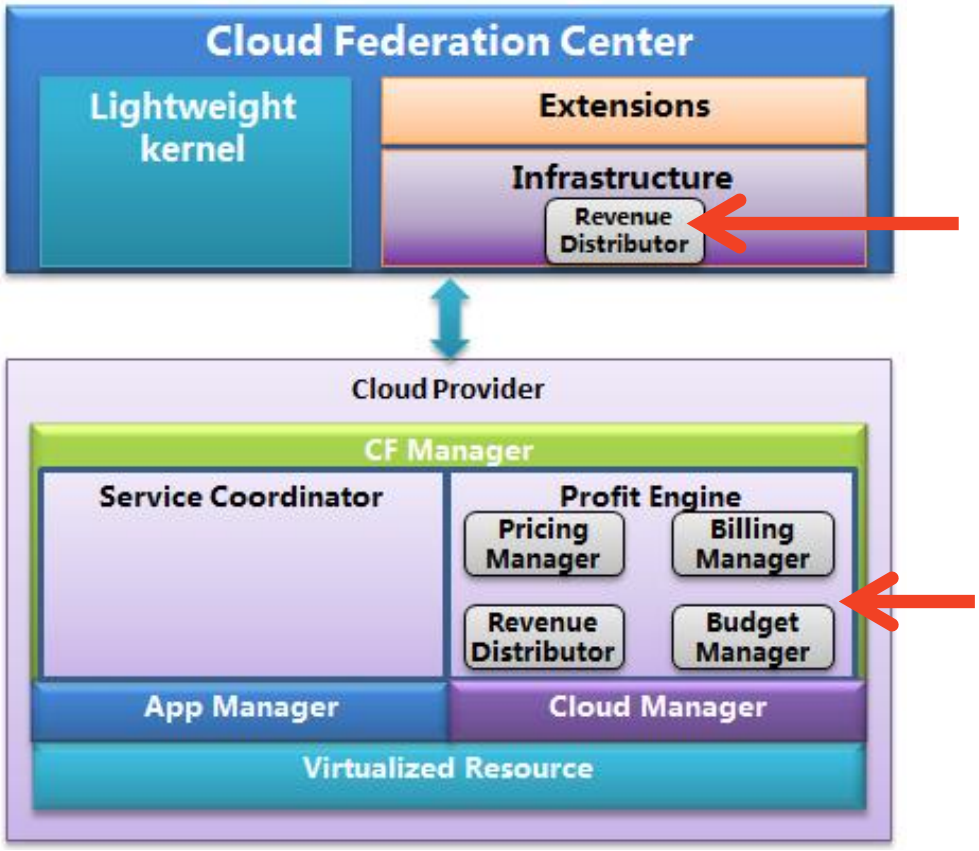
# DESIGN

Service Cooperation



# DESIGN

Revenue Distribution



# SIMULATION

## Setup

Availability of Candidate Clouds

| Cloud | Availabilities | | |
|---|---|---|---|
| | *Region* | *Zone* | *Host* |
| A | 99% | 98% | 97% |
| B | 98% | 99% | 97% |
| C | 99% | 99% | 98% |

Communication Cost between two VMs :

Single Host: 0;
In Single Zone: 1
In Different Zones of Single Region: 2;
In Different Regions of Single Cloud: 3;
In Different Cloud: 6;

Two Scenarios

Scaling Up: 3 VMs to 9 VMs; Availability > 99.998%

Scaling Down: 9 VMs to 3 VMs; Availability > 99.99%

Six Policies

Vertical only;

Horizontal t=1;

Horizontal t=2;

Horizontal t=4;

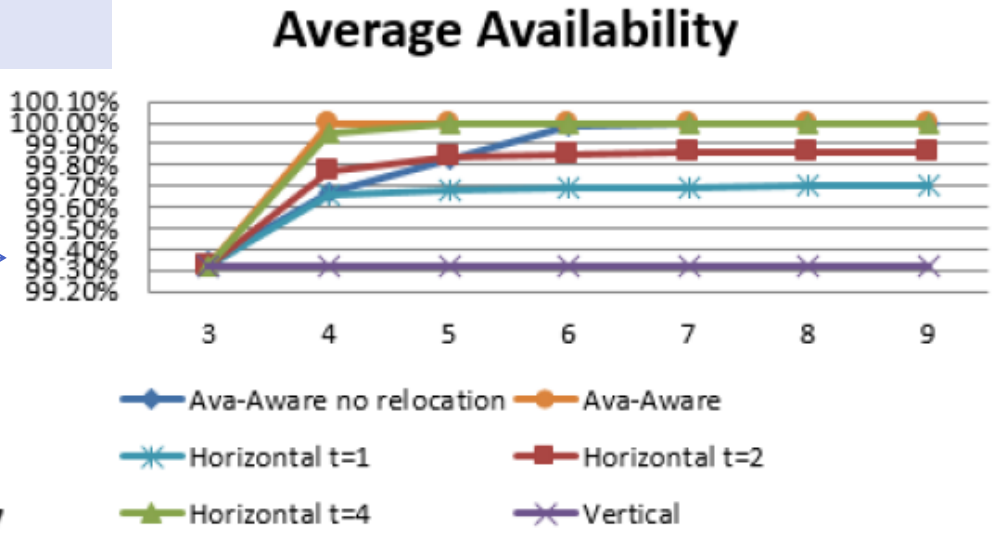
Ava-Aware no relocation;

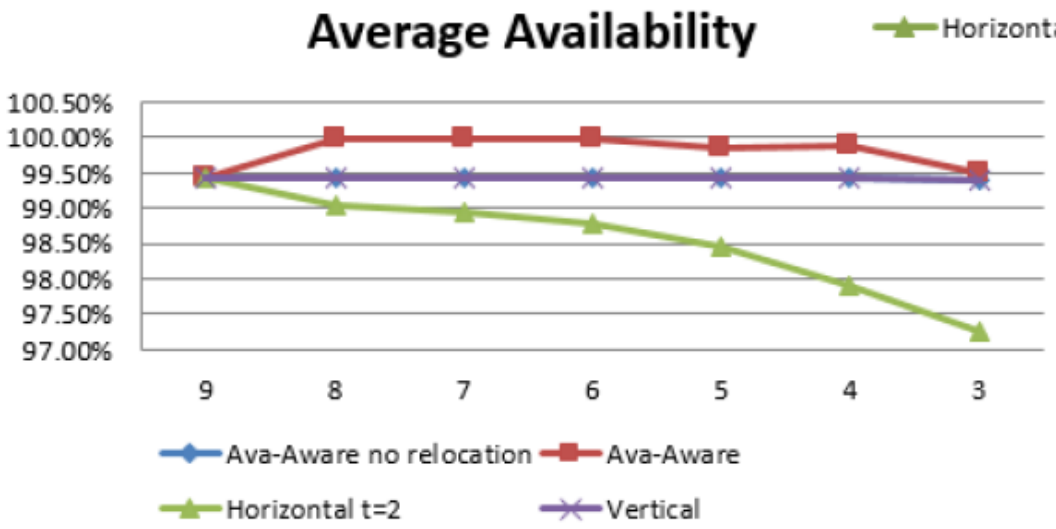
Ava-Aware;

# SIMULATION

Result

Average Availability When Scaling Up




Average Availability When Scaling Down

# THANKS

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