Hybrid Capacity Analytics

How Capacity Managers enable IT to become a broker of services in a hybrid cloud world

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CTO, Cirba Inc.
IT as the cloud broker

- IT doesn’t need a layer that just echoes prices and takes a cut
  - IT *is the broker*
  - IT has direct access to the markets and has *all the expertise*
  - What IT really needs is analytics that *quickly make sense of the data* so they can make optimal decisions and automate the process
Making optimal hybrid cloud decisions

- Where you put something depends on what it is doing

Batch job that runs hot and then turns off

Continuous business service that runs 24x7

Scale-out app that dynamically starts and stops VMs
What’s needed, in supply chain terms

**Demand**
Deep insight into workload demand patterns and requirements

**Supply**
Comprehensive model of infrastructure providers, capabilities and costs
Deep insight into workload demands

- CPU
- Memory
- I/O

Requires WebSphere Silver Tier Storage
Requires PCI
Green Zone
Needs Daily Backup
…
Deep insight into workload demands

- Requires Oracle Gold Tier Storage
- Requires PCI Green Zone
- Needs Active DR ...

- Requires WebSphere Silver Tier Storage
- Requires PCI Green Zone
- Needs Daily Backup ...

- Requires Apache Bronze Tier Storage
- No Backup
- Yellow Zone ...

Applications
  - Customer Claims
    - Database
      - lin-vm-5293
      - lin-vm-5341
    - Java
      - lin-vm-5209
      - lin-vm-5221
      - lin-vm-5263
      - lin-vm-5601
    - Webserver
      - lin-vm-5026
      - lin-vm-5049
      - lin-vm-5055
      - lin-vm-5153
      - lin-vm-5157
      - lin-vm-5191
      - lin-vm-5361
      - lin-vm-5370
  - Data Warehouse
  - Forecast Planning
  - Image Processing
  - Infrastructure Apps
  - JRS Backend
  - Warehouse Apps
  - WebSphere
App-Level View

Aggregate Resource Requirements

Aggregate Technical and Business Requirements
Deep insight into workload demand patterns and requirements

Comprehensive model of infrastructure providers, capabilities and costs
Public cloud offerings

- 54 different instance types
- Different generations of hardware with varying performance levels
- 86 Sizing Options in Several Tiers
- CPU, RAM and Disk are locked in a pre-set ratios
- Ability to separately select CPU and RAM size, making for approximately 64 different VM size combinations
- Only guarantees 2.0GHz CPU cores
Mapping real workloads to these providers

Example 1: the impact of cloud catalogs on hosting decisions

In order to get enough Memory in AWS you are forced to over-configure CPU resources.

In order to get enough CPU capacity in Azure you are forced to over-configure memory resources.

<table>
<thead>
<tr>
<th>CPU</th>
<th>Current</th>
<th>AWS</th>
<th>Azure</th>
<th>SoftLayer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory</td>
<td>16384</td>
<td>16384</td>
<td>28672</td>
<td>16384</td>
</tr>
<tr>
<td>Catalog Type</td>
<td>m4.xlarge-4X16-Windows</td>
<td>Standard_GS1-2X28.672-Windows</td>
<td>soft.2x16-2X16-Windows</td>
<td></td>
</tr>
</tbody>
</table>

SoftLayer allows independent sizing of CPU and Memory, giving a better fit.
Example 2: the impact of cloud infrastructure performance on hosting decisions.

Because AWS has faster cores than Azure of SoftLayer, this workload will fit in a 4-way instance, making it cheaper than in other providers for this specific workload.

Cirba analysis uses benchmarks to automatically account for this.

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>AWS</th>
<th>Azure</th>
<th>SoftLayer</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Memory</td>
<td>16384</td>
<td>31232</td>
<td>28672</td>
<td>32768</td>
</tr>
<tr>
<td>Cost</td>
<td>--</td>
<td>$3,749</td>
<td>$12,158</td>
<td>$5,895</td>
</tr>
<tr>
<td>Cint 2006</td>
<td>315.38</td>
<td>199</td>
<td>256</td>
<td>329.2</td>
</tr>
<tr>
<td>Catalog Type</td>
<td>--</td>
<td>r3.xlarge-4X30.5-Windows</td>
<td>Standard_D4-8X28.672-Windows</td>
<td>soft.8x32-8X32-Windows</td>
</tr>
</tbody>
</table>
Comprehensive model of infrastructure providers, capabilities and costs

Demand

Customer Claims

Forecast Planning

Infrastructure Apps

JRS Backend

WebSphere

Data Warehouse

Image Processing

Warehouse Apps

Supply

Amazon Web Services

Microsoft Azure

SoftLayer, an IBM Company
Virtual and Bare Metal Infrastructure

- T-Shirt instance sizing model
- Cost based on catalog size
- Typically sized to peak utilization
- User pays for capacity whether it is used or not (no overcommit)

- Dedicated bare metal servers
- User pays for server, not VM
- Hypervisor allows workload stacking
- User has opportunity to dovetail workloads and **leverage overcommit**

![S M L sizing icons](image)

![Bare Metal Servers with VMware](image)
Virtual and Bare Metal Infrastructure

983 Workloads: AWS 1-year Hosting Cost with densify.com catalog optimization

$1,892,733

SoftLayer Bare Metal 1-year Hosting Cost with densify.com placement & allocation optimization

$983,625

Net Savings vs optimized AWS: 48%

Coming Soon...
What if we use containers?

983 Workloads: AWS 1-year Hosting Cost with densify.com catalog optimization

$1,892,733

Extra large Amazon Instances with optimized container stacking using densify.com

$325,285

Net Savings vs optimized AWS: 82%

x1.32xlarge instances (128x1952)

Docker Containers
Demand

Supply

Customer Claims
Forecast Planning
Infrastructure Apps
JRS Backend
Data Warehouse
Image Processing
Warehouse Apps
WebSphere

???

vmware + amazon web services
Microsoft Azure
SOFTLAYER an IBM Company
amazon web services
docker
SOFTLAYER an IBM Company
vmware
Microsoft Azure Stack
How do we figure this out?

- It requires deep analysis of supply and demand
  - Can’t be done with spreadsheets
  - Cloud broker products don’t focus on this analysis
  - It isn’t just a financial exercise

- **Capacity managers are critical to this**
  - They have the knowledge of the precise needs of the business
  - They understand workloads and how they map to infrastructure
  - These factors are key to driving automation and agility

- Even for a single cloud provider complex decisions need to be made
  - Catalogs, offerings, service tiers, bare metal strategies, container strategies
  - Jurisdiction and venue options
Cirba’s Advanced Analysis Engine

Policy

Multi-Dimensional Permutation Analysis

Optimization Plan

- Existing workloads on existing gear
- New workloads onto existing gear
- Existing workload onto new gear/venue

CPU Allocation

- 2.0
- 3.0

Memory Allocation

- 4600.0
- 8102.0

VM Placement

- eec-host-17
- eec-host-211

CPU Allocation

- 4.0
- 5.0

VM Placement

- eec-host-129
- eec-host-211

Technical and Business Attributes

CPU

Memory

I/O
Multi-Provider Analysis Example
## Analysis of IaaS vs Bare Metal + Hypervisor

### VMware on SoftLayer Bare Metal

#### Analysis Results for Warehouse apps to external cloud

**Consolidation Summary**

<table>
<thead>
<tr>
<th>Public cloud using “Tee Shirt” sizing</th>
<th>Same provider using bare metal (with hypervisor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 SoftLayer Virtual Instances Various Sizes</td>
<td>4 SoftLayer BareMetal Nodes Xeon E5-2650 128GB</td>
</tr>
<tr>
<td>$13,531/month</td>
<td>$6,681/month</td>
</tr>
</tbody>
</table>

| 60 Transfers |

**Aggregate Summary**

| Before Consolidation (Avg 9.43 %) | After Consolidation (Avg 41.00 %) |

- **CPU Utilization (%)**
  - Minimum/Maximum
  - Sustained Activity = Upper Limit 99

* GNT2009 Rate Server Performance Data by SPEC

Overcommit enables over 4X higher utilization
Hybrid Cloud Placement Automation

New Application or Cloud Request

Windows OS
Requires SQL server
Has customer data
Needs Gold tier storage
Must run on east coast

- Houston
- New York
- London
Demand

Supply

Hybrid Capacity Analytics
Key use cases

1. De-Risk & Densify
2. Transform to Cloud
3. Reduce Cloud Spend

- Public IaaS
- Public Bare Metal
- On-Prem Virtual/Cloud
Unique SaaS Model

A Unique combination of **SaaS-based** analytics and **expert guidance**

Hybrid Capacity Analytics = Cloud-Hosted Analytics + Intuitive UI + Expert Insight

No manuals, No training, No implementation

**Just outcomes**
Benefits

- **Lowest Cost and Lowest Risk**
  - Based on detailed data, not averages/peaks or estimates
  - Fully normalized, includes all resources (e.g. I/O patterns)
  - Resulting hybrid infrastructure costs are typically 20-80% cheaper than with spreadsheets or basic brokers

- **Provides Full Automation**
  - API for precise, automated placement of new apps
  - Ongoing optimization of placements, instances sizes

- **Allows IT to become a true broker, not just an order taker**
Enabled in 15 minutes

AIX

Midrange Connector

vCenter or vROps

CloudWatch API

Microsoft Azure

SoftLayer

Densification Advisor

Densify.com powered by Cirba
Hybrid Capacity Analytics

Thank You