VMware vSphere Cluster Resource Pools
Best Practices

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- Technical feasibility and market demand will affect final delivery.

- Pricing and packaging for any new technologies or features discussed or presented have not been determined.
Talk Outline

- Resource Distribution
- Resource Controls
- Resource Pool Cookbook
Introduction

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  - Co-Author of vSphere 4.1, 5.0 and 5.1 clustering deepdive books

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  - Co-Author of Mastering VMware Virtual Infrastructure 3
  - Author of MCITP Microsoft Exchange 2007 Messaging Design and Deployment Study Guide
DRS Cluster

- Aggregates ESXi host capacity into one large pool
- Functions as the root resource pool
- Provide an abstraction layer between resource providers and resource consumers

- ESXi Host: Resource provider
- Virtual machine: Resource consumer
- Resource pool: Both
Resource Consumers and Providers

- Resource pools: allocation and isolation of groups of VMs
- Consume resources from cluster
- Provide resources to their consumers

Diagram:
- ESXi-01
- ESXi-02
- ESXi-03
- Cluster
- Resource Pool
- VM1

-提供资源
- 消耗资源
Resource Distribution

- Resource pools are always first stop in resource distribution

![Diagram showing resource distribution](image-url)
Sibling Rivalry

- This means that RP1 and RP2 are the first to compete for resources.
Resource Controls
Why Need Resource Controls?

- What if: Sum of VM Demand > Cluster capacity
- Need a way to decide who gets what.
- This is where resource controls come in
- Goal: Enable high consolidation and over-commitment safely!
Resource Controls

- Reservation: Guaranteed physical allocation (MIN)
- Shares: Allocation in between
- Limit: Guaranteed upper bound (MAX)
- Available on VM level and Resource Pool level
- Expandable reservation
Shares

- Specify the relative importance of object on sibling level

Cluster
12000 shares issued

33%

Resource Pool 1
4000 Shares

Resource Pool 2
8000 Shares
Shares

- **Four share levels**
  - Low (1)
  - Normal (2)
  - High (4)
  - Custom

- **Normal share level on Resource Pool equals:**
  - 4000 shares of CPU (1000 shares per vCPU)
  - 163,840 shares or memory (10 shares per MB)

- **Monster VM (64 vCPU, 1 TB memory High share level)**
  - 128,000 shares of CPU
  - 2,048,000,000 shares
Common Cluster Tree

- Common cluster-tree equals:
Resource Distribution

Cluster

25% of cluster resources

Resource Pool 1
4000 Shares

VM 10000
VM 10000
VM 10000

25% 25% 25%

8.3% of cluster resources

25% 25% 25%

1 1 1

VM 4000 VM 4000 VM 4000
Test-DEV Resource Pool Design

- Typical Test/DEV and production RP design
- 1 RP for Production (High)
- 1 RP for Staging, test and Development (Low)

Cluster
10,000 shares issued

3 VMs in the pool

- 20%

Resource Pool 1
2000 Shares

VM 10000 VM 10000 VM 10000

a VM receives 6.66% of cluster resources

Resource Pool 2
8000 Shares

1 1 1 1 1 1 1 1 1 1 VM 10000

30 VMs in the pool

a VM receives 2.66% of cluster resources
Solution

- Use custom shares
- Use script to define custom shares based on a pre-defined weight and the amount of VMs / vCPUs in the resource pool
- Use Resource Pool reservations
- Use Resource Pool limits
Reservations and Limits

- Reservations: Minimum physical resource allocation for the pool
- Limit: Maximum physical resource allocation for the pool
- The pool is limited or guaranteed an X amount of physical resources
Resource Pool Reservation

- Reservations are not limits
- Shares are used for access non-protected resources

Resource Pool 2
40 GB Reservation / 8000 Shares

Resource Pool 1
2000 Shares

40 GB Reservation

8000 Shares

2000 Shares

Protected by Reservation

Access based on shares

Cluster
10,000 shares issued
Resource Pool Reservation

- Resource Pool “lends out” portion of physical resource to VM
- Dynamic entitlement of VM determines resource allocation within the pool
  - Activity
  - Resource allocation settings defined on VM-level
VM Reservation in a Resource Pool

- Extracted from RP-level reservation
- Static solution
- VM protected memory unavailable for other VMs
- Impact on HA Admission Control
  - VM-Level Reservation impacts slot sizes
  - RP-Level Reservation is ignored by HA
VM Level Reservation in a Resource Pool—Admission Control

- **Reduces Consolidation Ratio**

- **Resource Pool Reservation satisfies VM reservation**
VM Level Reservation in a Resource Pool—Admission Control

- 1GB VM-level reservation
- 1GB Opportunistic access
- VM2 2GB
- Resource Pool 10 GB Reservation
- Allocated based on Shares
- 9GB Reserved memory available
- Admission control
- VM1
- Withdrawn from resource pool reservation
- Unreserved memory
VM Level Reservation in a Resource Pool—Admission Control

- No more Resource Pool reserved resource to satisfy VM reservation

- Result: Power-on operation failure

- Possible Solution:
  - Expandable Reservation
Expandable Reservation

- Allows resource pool to “confiscate” reserved resources from parent
- Does not consider reserved resources from siblings
- Search halts at resource pool with limit or disabled Expandable Reservation
- Is dynamic, once demand drops reserved resources are returned to parent
Limits

- Apply to child objects within the resource pool collectively
- Adjust the maximum amount of resource available per child object
- Depends on dynamic entitlement of child object
- When calculating limit on a resource pool take reservation and memory overhead reservation into account!
Tier 1 Application—Contention Mitigation Strategy
Contention Mitigation Strategy

- Apply Contention Mitigation Strategies at parent pool levels only
- Configure adequate resource and share value to suit application requirements and number of VMs
- Individual per VM shares and resource settings are not maintained in BCDR scenarios by SRM
Recommended Resource Pools Practices

- Consider the effect of over populating resource pools
- Consider hardware resource limitations
- Maintain a reservation of 10 to 20 resources available for host when allocating resources to resource pools
FILL OUT A SURVEY

EVERY COMPLETE SURVEY IS ENTERED INTO DRAWING FOR A $25 VMWARE COMPANY STORE GIFT CERTIFICATE
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