

Accelerating Application Performance – Tier 0

Richard Gillett
Acopia Networks

Copyright© 2007, Acopia Networks®, Inc. All Rights Reserved
Acopia Networks® and ARX® are registered trademarks of Acopia Networks, Inc. All other brands, products, or service names may be trademarks or service marks of the companies with which they are associated.

Agenda

- Traditional tiered storage
- A new kind of tiered storage
- High-performance storage options
- Solution example
- Summary

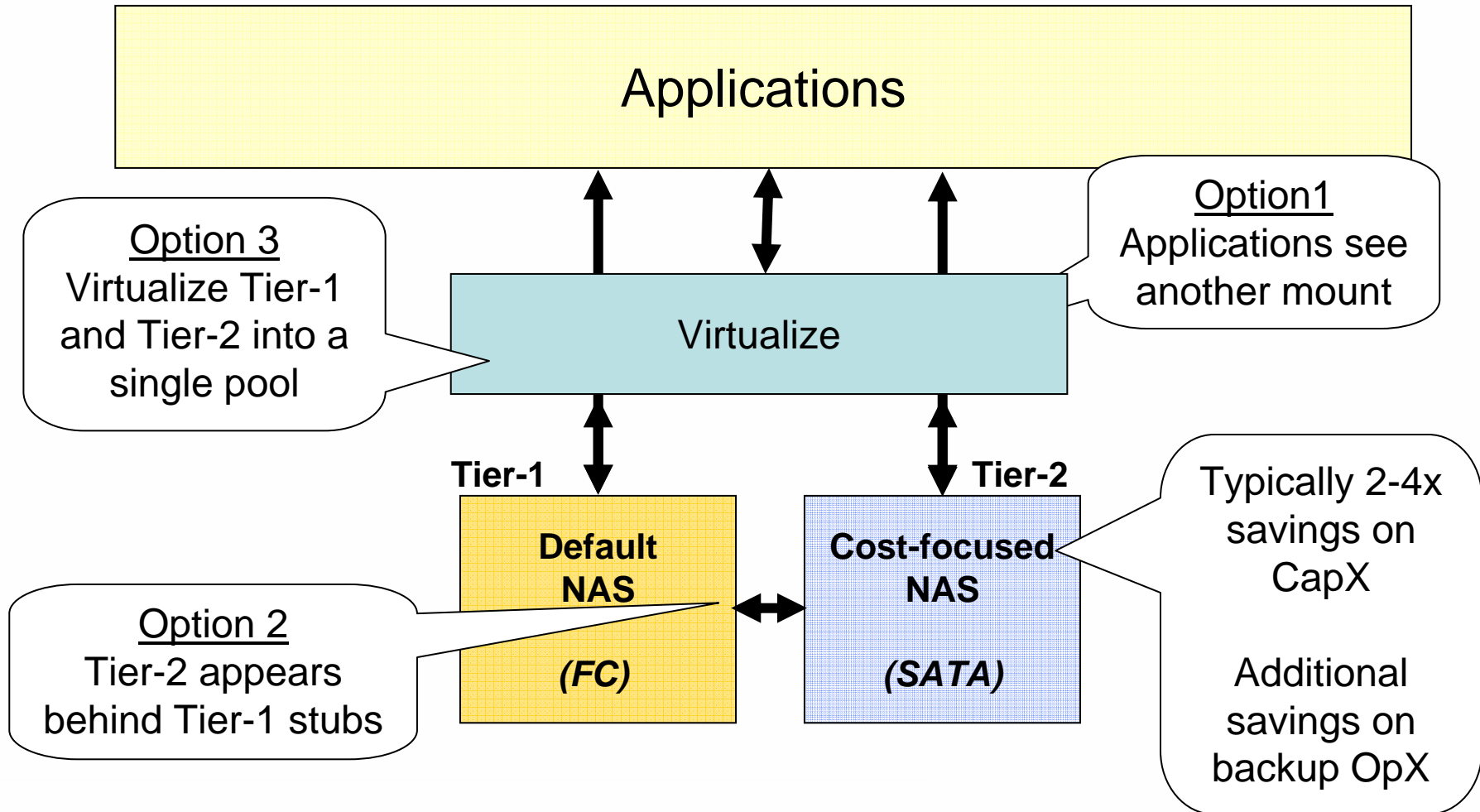
- Q&A

Traditional Tiered Storage

Traditional Tiered Storage

- Traditionally, tiered storage has been used to integrate a lower cost storage pool for the purposes of off-loading Tier-1 storage of infrequently accessed data
 - In a simple world: “FC” = Tier-1 and “SATA” = Tier-2
- Simple policies based on file access or modify time can be used to identify candidates for migration to Tier-2
- Assuming Tier-2 can be integrated without impact to the existing storage users, the cost savings are significant
- On the next slide, we will describe ways Tier-2 NAS storage can be integrated with existing Tier-1 NAS storage

Traditional Tiered Storage



A new kind of Tiered Storage

A New Tier of Storage

Applications

Tier-0

**Performance
Optimized**
(Memory)

Tier-1

**Default
NAS**
(FC)

Tier-2

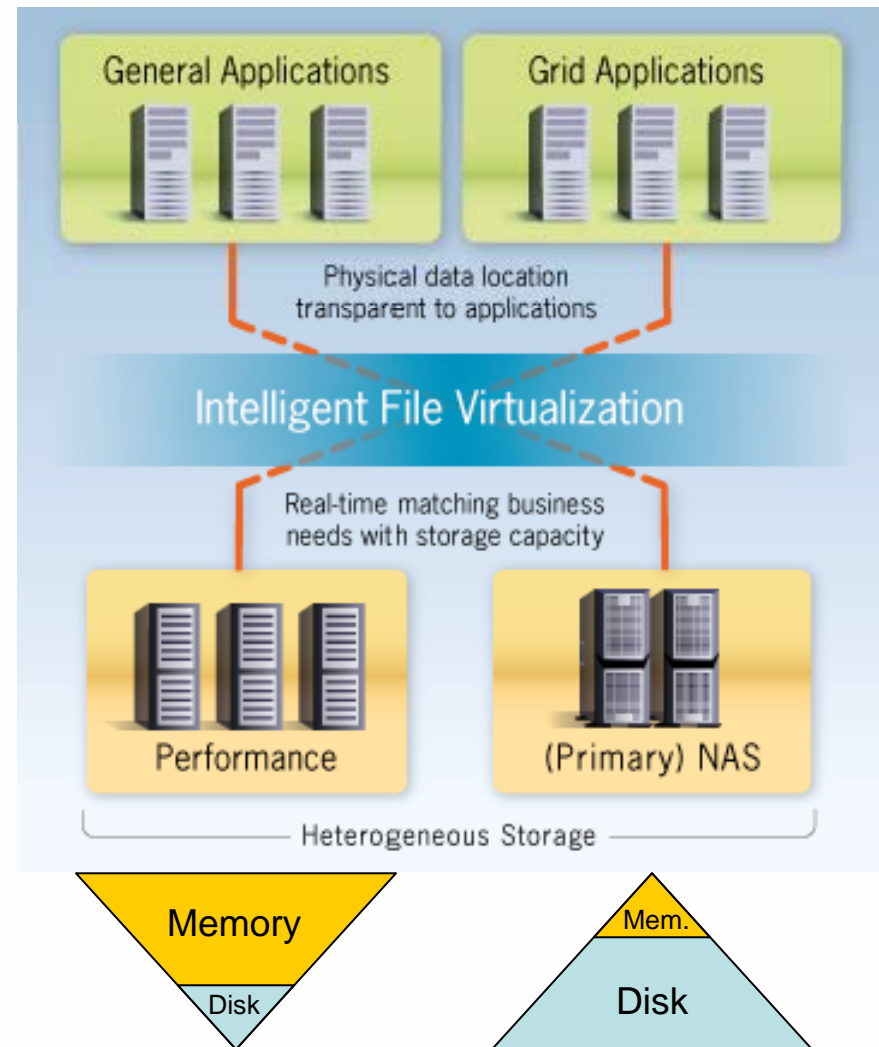
**Cost-focused
NAS**
(SATA)

Tier-3






**Capacity
Optimized
Storage**
*(Compressed
SATA)*

What is Tier 0?

- Definition: *Tier 0 is a storage tier optimized and intelligently managed for the purpose of high-performance serving to applications*
- Utilizes memory space of industry standard servers instead of disk
- Applications see Tier 0 and Tier 1 as a single storage pool
- Managed identically to other NAS devices and transparent to the application through automatic placement policies



The Memory Opportunity

- Over the last year, the alignment between several important parameters has greatly increased:
 - Cost of high-performance memory 
 - Size of memory in a mainstream server 
 - Performance of memory in mainstream servers 
 - Performance of network in mainstream servers 
 - Size of application's "critical working sets" 

A Mainstream Server of 2007

- 2-4 fast processor cores
- 16-32GB memory
- >4 GBytes/sec memory bandwidth
- >500MB/sec network bandwidth
- >500MB/sec NAS serving bandwidth

- Cost from a Tier-1 server supplier:
 - ~\$4000-8000

Achille's Heal

- Disk performance is poor when the application has a non-sequentially-accessed working set larger than cache memory of the NAS server

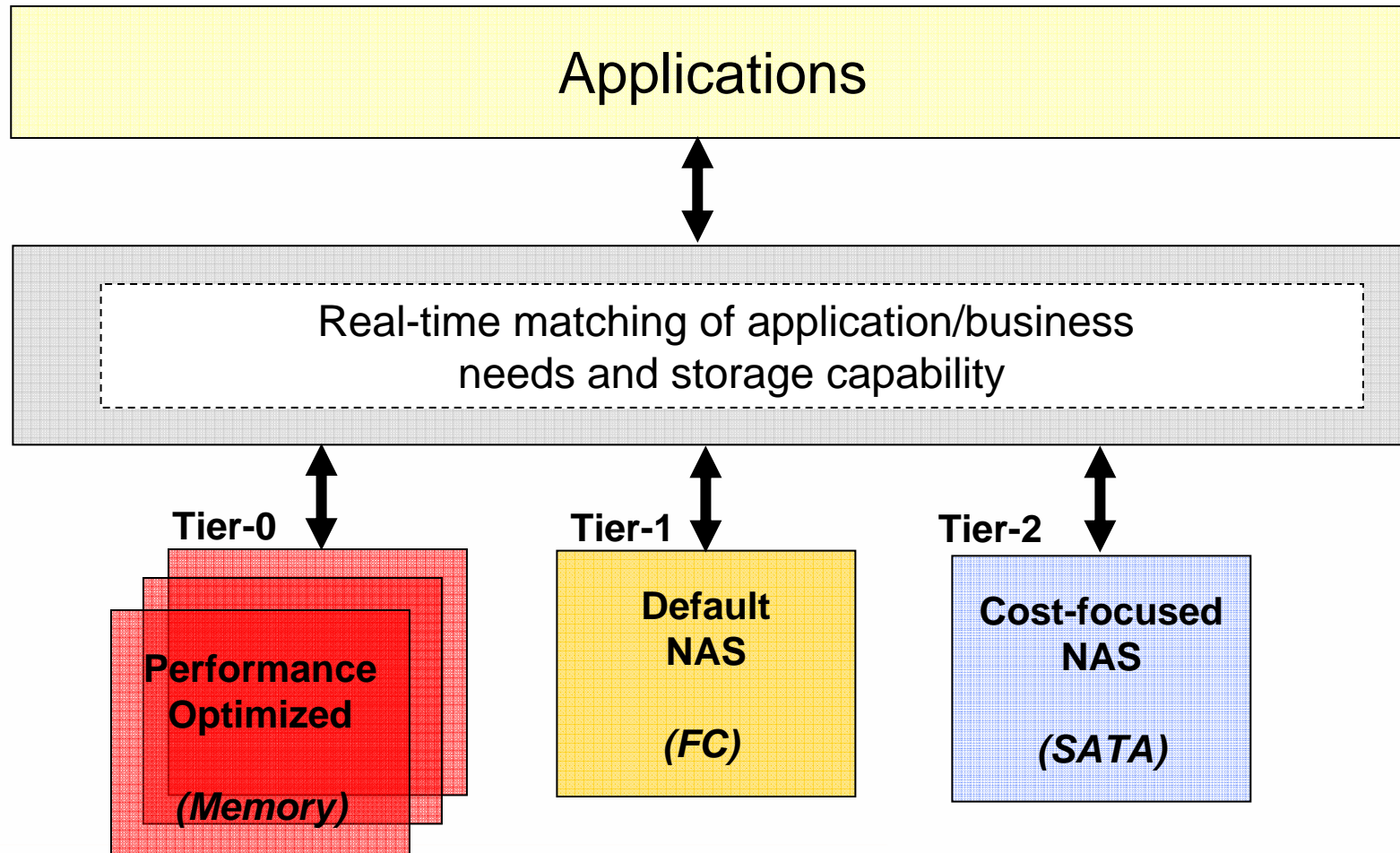
Working Set	NAS Server with 3GB memory	Server with 16 GB memory
1 GB	120 (limited by 1Gb link)	450 (limited by 4x1Gb channel)
5 GB	21	450
10 GB	18	450
15 GB	17	450 26x Faster

An Integrated Tier-1 and Tier-0 Solution

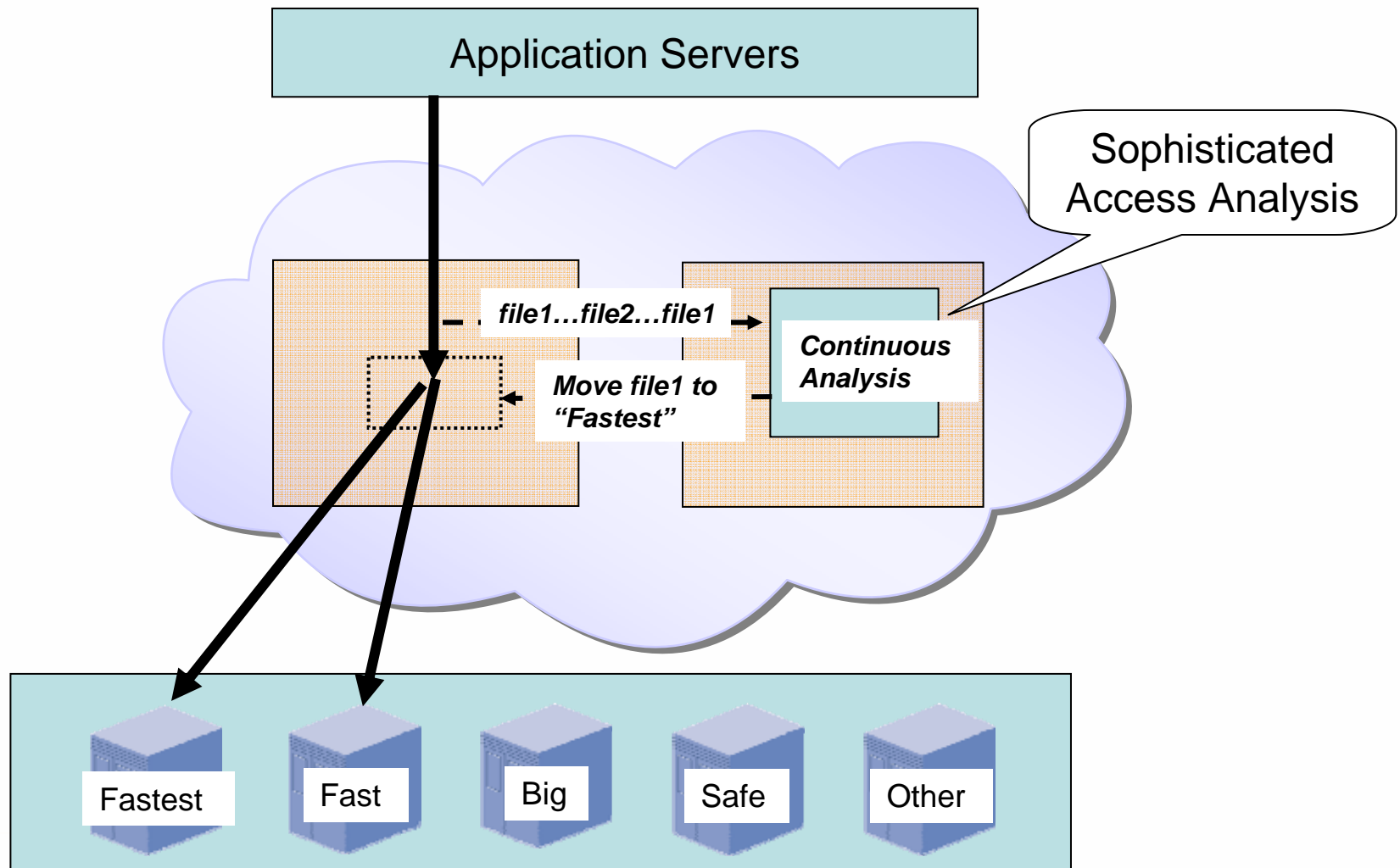
Desirable Characteristics

- Transparent integration with existing Tier-1
 - Applications see the same namespace
- Analysis service to determine application characteristics and best placement policy
 - Humans don't have to guess the best policy
- Flexible file-level placement capability
 - Individual files can be dynamically placed anywhere within the Tier-0 and Tier-1 resources
- Ability to transparently scale Tier-0 capacity across the range of working set requirements
 - 10 to 100GB is a good place to start...

Three-Tier Solution

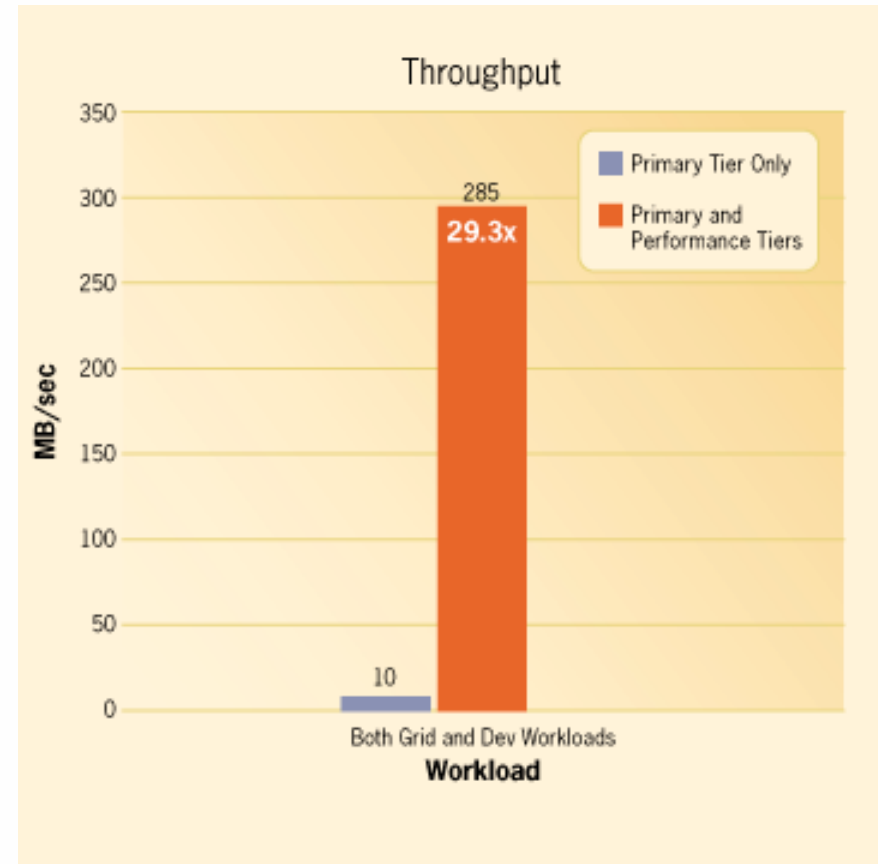


Application Acceleration



Benefits of Tier 0

- Performance
 - Data access at memory speeds
 - Reduces and increases performance for storage remaining on Tier-1
- Lower Cost (up to 500:1)
 - Tier 0: <\$10 per MB/sec
 - Tier 1: >\$5,000 per MB/sec
- No disruption
 - Can be deployed non-disruptively
 - Data subsets are transparently migrated to and from Tier 0 as application computing needs dictate
- Available today
 - Makes use of industry standard servers and intelligent file virtualization



Summary

- Tier-2 and Tier-0 are both approaches to better align storage and business needs
- Tier-0 focuses on making applications run faster and more predictability
- While almost any NAS server can be used as a Tier-0 server, mainstream servers with large memory configurations are very attractive building blocks for many applications
- Integrating Tier-0 into existing infrastructure is a challenge
 - Network-based virtualization is one way to address this challenge