

IBM System z & Storage Synergy

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Agenda

- **DS8870 Overview**
- **DS8870 + z/OS Synergy**
 - **Performance**
 - **Management & Growth**
 - **Business Continuity**
- **Summary**

IBM DS8870 Disk Storage Subsystem

IBM POWER Server synergy and Power System upgrade

- ✓ New POWER7 controller
- ✓ New DC-UPS Power system
- ✓ All DDM's Encryption capable

Features / Business Value

- ✓ New processors and bus architecture boost performance with faster access to host servers and disk drives
- ✓ New small-form-factor drives offer faster performance, higher availability, lower energy consumption, and allow denser footprint for more effective scalability
- ✓ Easy Tier – Dynamic Storage Hierarchy – SDD/FC/SATA
- ✓ IBM Storage Common GUI
- ✓ Synergy with System z
- ✓ Storage Based Data Replication Functionality
- ✓ GDPS High Availability & Disaster Recovery

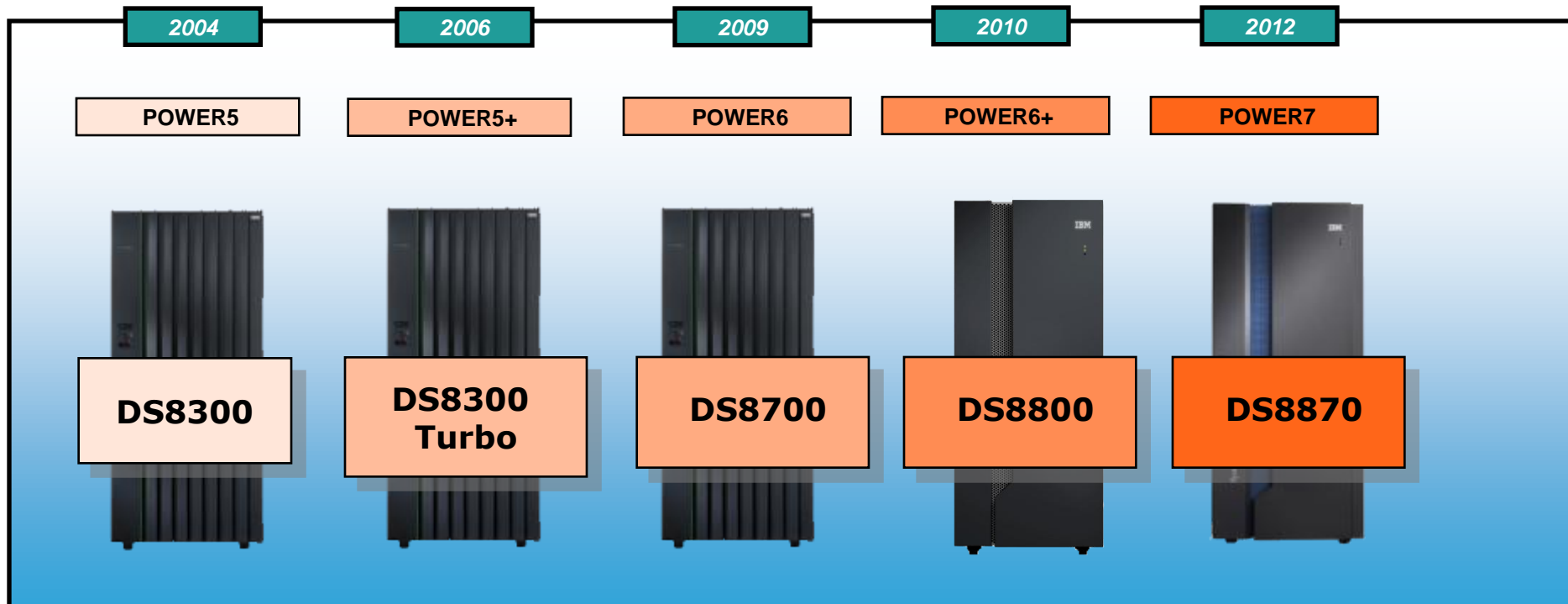
Client Benefits

- ✓ System-wide upgrades enable faster performance and higher storage capacity within the same footprint
- ✓ New Power system increases Power Efficiency and Power Dissipation per GB installed and IOPs

| | |
|----------------------------------|------------------------------------|
| DS8800 | DS8800 |
| DDMs | 16-1536 |
| DDM Interface | 6Gbps SAS-2 |
| Enterprise (FC/SAS) DDM Types | SAS FDE - 146, 300, 600, 900 GB |
| SATA DDM Types | FDE 3TB |
| SSD DDM Types | FDE 400 GB |
| RAID Types | RAID 5, 6, 10 |
| Max Usable Capacity | |
| Max Sequential Bandwidth (MB/s) | 21.1MB/s |
| Max Number of LUNs / CKD volumes | 64K total |
| Max N-Port Logins/Port | 510 |
| Max Process Logins | 2K |
| Max Logical Paths / CU | 512 |
| Max LUN Size | 16 TB |
| Dynamic Provisioning | Add / Del / Depopulate rank |
| Cache / NVS | 32-1000GB / 1-32GB |
| Processor | P7 3.5GHz 2, 4, 8, 16 - Cores |
| Host Adapters | 8 Gb FC x 4 or 8 ports per adapter |
| Host Adapter Slots | 16 |
| Max Host Adapter Ports | 128 |
| Single DA Throughput | 1,600MB/s+ |
| DA Slots | 16 |

DS8870 -> 5th Generation DS8000 Disk System

- Building on a market-proven, reliable code base!
- 94% of the same proven microcode



- *Designed for Enterprise environments with over 5-9's availability natively*
- *Designed for Enterprise environments with over 6-9's availability when DS8000 with Metro Mirror is combined with GDPS/PPRC HyperSwap*

DS8870 Overview



Smarter Storage for enterprise critical information environments

- **Built on the DS8800 base**
 - **Exceptionally fast with up to 3X performance increase**
 - **Proven architecture and code base for optimal reliability with non-disruptive microcode updates**
 - **Inherited all functionality of DS8800**
 - **RoHS compliance reduces hazardous material**

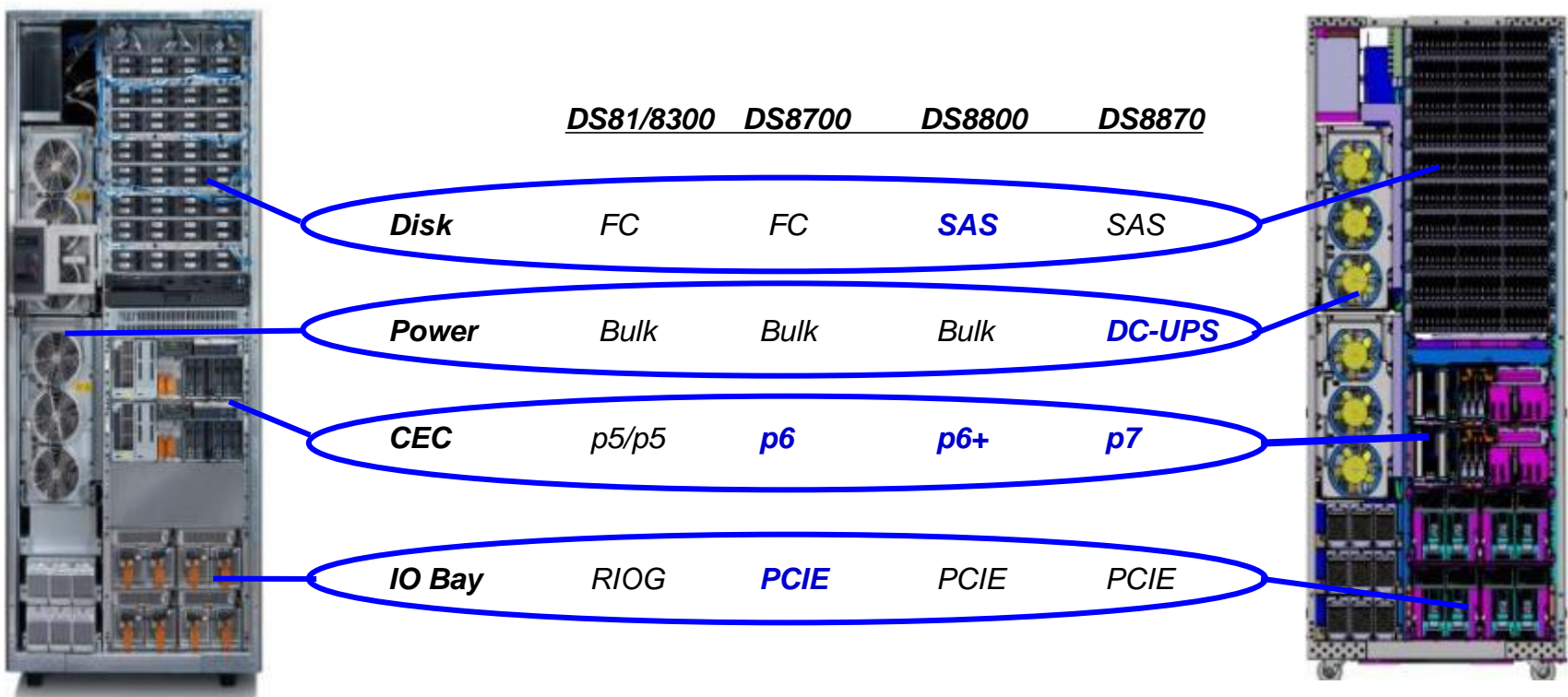
- **New dual IBM POWER7 controllers – unprecedented scaling**
 - **Scalable processor configurations with 2, 4, 8 and 16 cores per controller**
 - **Scalable cache from 16 GB – 1 TB**
 - **Everything scales non-disruptively**
 - **Entry-level Business Class configuration also available**

- **New energy-efficient power supply**
 - **Improved efficiency, power dissipation, reliability**
 - **Up to 20% reduction in energy usage**
 - **Designed to meet upcoming ENERGY STAR standard**

- **Full Disk Encryption drives now standard**
 - **Client decides when to encrypt or not^{*)}**



DS8000 Enterprise Disk Systems – Hardware Evolution

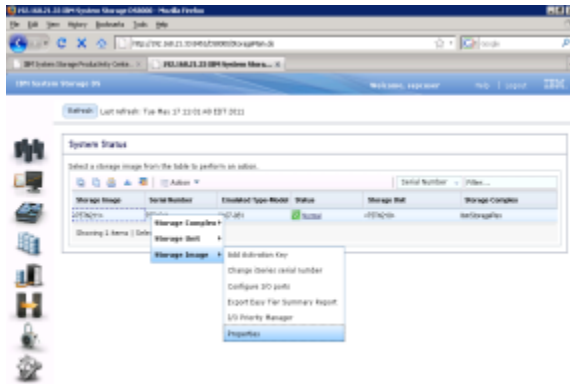


➤ Incremental changes between versions maximizes quality

IBM System Storage DS8870 — Features That Continue



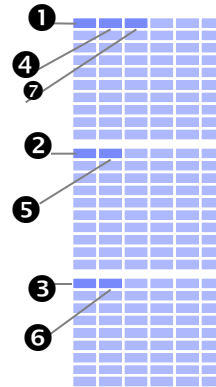
Easy to use GUI



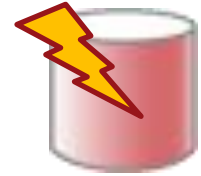
Storage Pool Striping

Storage Pool Striping is an algorithm choice for volume creation which allows for better backend disk utilization

Volumes are created by allocating one Extent from available Ranks in an Extent Pool, in a round-robin fashion



“Quick Init”



Quick Initialization provides volume initialization that is up to 2.6 times faster and therefore allows the creation of devices and making them available as soon as the command completes.

Align Risk and Performance

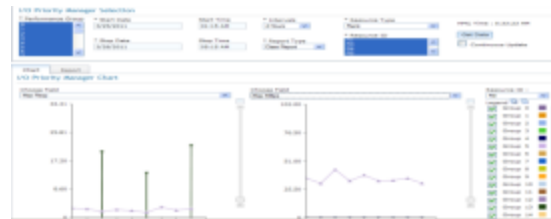
TIER 8 - Application/workload level HA; Automatic monitoring; Automatic workload routing/recovery; Uses async replication between sites

TIER 7: RPO=near zero, RTO <1min, Automatic Continuous Availability

TIER 6: RPO=Near Zero, RTO <1Hr. to 4 hours, Manual Disk or Tape Data Mirroring

TIER 4: RPO > 15 min. RTO= 4+ hours, Manual PiT or SW Data Replication.

I/O Priority Queuing



I/O Priority Manager attempts to make sure the most import I/O operations get serviced when a given rank is overloaded by the workload on the storage system

EASY TIER

Easy Tier 1 (DS8700 R5.1)

Automated cross-tier performance management for *SSD/HDD hybrid pools*

Easy Tier 2 (R6.1)

Automated cross-tier performance or storage economics management for hybrid pools with *any 2 tiers* (SSD/ENT, SSD/NL or ENT/NL)

Easy Tier 3 (R6.2)

Automated cross-tier performance and storage economics management for hybrid pools with *3 tiers* (SSD/ENT/NL)

Easy Tier 4 (R6.3)

Support for *encryption capable environments*



Official Storage Performance Council (SPC) results



- **SPC-1 throughput of 451,082 IOPS**
 - #1 result for single, enterprise-class all-HDD system
 - 67% faster than HDS VSP
- **SPC-2 throughput of 15,424 MB/s**
 - #1 result overall
 - 6% faster than prior #1 result
 - 17% faster than HDS VSP
 - 59% faster than DS8800

Note: DS8870 results were published on October 3, 2012 on SPC web site

SPC Benchmark 1 (SPC-1) results page – http://www.storageperformance.org/results/benchmark_results_spc1

SPC Benchmark 2 (SPC-2) results page – http://www.storageperformance.org/results/benchmark_results_spc2

System Storage and System z A unique synergy

System z and System Storage Synergy Advantages:

- ▶ Collaborate on architecture and design
- ▶ End to End Focus – Place Function in correct place in HW/SW Stack !
 - ▶ System z Hardware/Channel/DS8800
 - ▶ DB2/z/OS DFSMS, IOS/zHPF/DS8800
 - ▶ zWLM can manage workload end to end
 - ▶ Performance, Availability, Management & Growth
- ▶ Conduct early, rigorous and comprehensive stress testing In System z labs for every enterprise storage release. Tests are designed to push the limits of functionality and robustness.
- ▶ Share skilled support resources with enterprise class experience and expertise

This helps System Storage and System z development to:

- ▶ Better design products that work well together with more robust interlocking
- ▶ Bypass potential pitfalls with fixes implemented before customers are ever impacted
- ▶ Implement streamlined, efficient, integrated solution offerings
- ▶ Ensure that products that have passed stringent testing together

System z DS8800 Synergy Items

FICON Express2 MIDAW

Support for 64K cylinder 3390s (about 19 3390-3s)

AMP: Adaptive Multi-stream Prefetching in a Shared Cache *

Maximum concurrent FICON requests per FICON port

HyperPAV

C.U.I.R. (control unit initiated reconfiguration))

I/O Priority Queuing

Full FlashCopy compatibility

GDPS /Global Mirror

XRC (a.k.a. z/OS Global Mirror)

z/OS Global Mirror (XRC) write pacing

z/OS Global Mirror (XRC) suspend rather than long busy

Dynamic volume expansion *

z/OS Global Mirror (XRC) multiple reader

z/OS Global Mirror (XRC) ext. distance FICON

z/OS M/GM HyperSwap with incremental resync

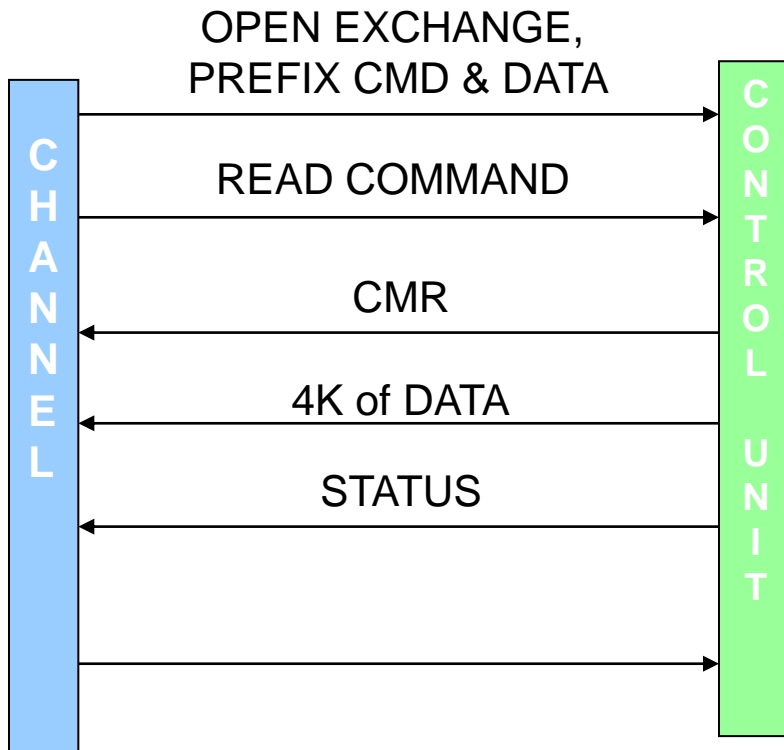
z/OS Basic HyperSwap

3390s larger than 64K cylinders

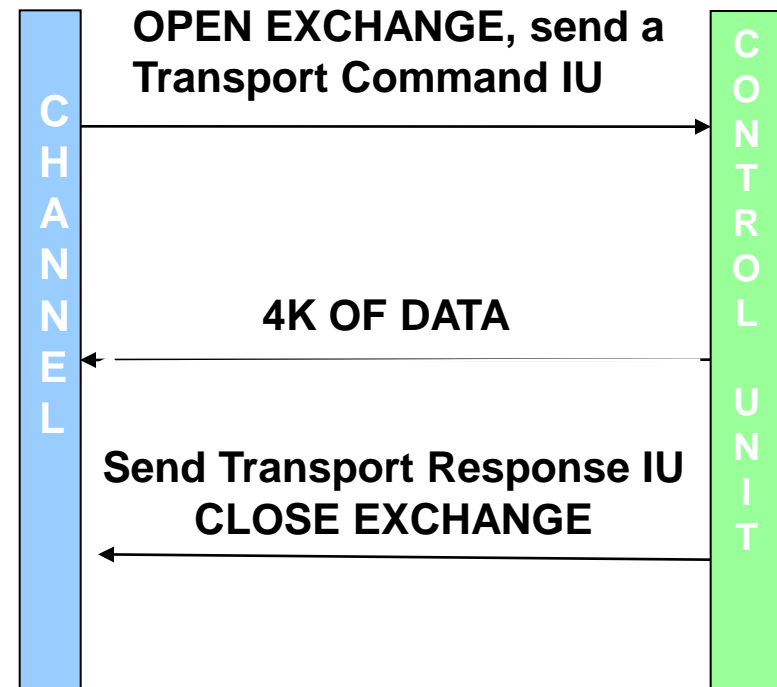
Performance

Link Protocol Comparison for a 4KB READ

FICON



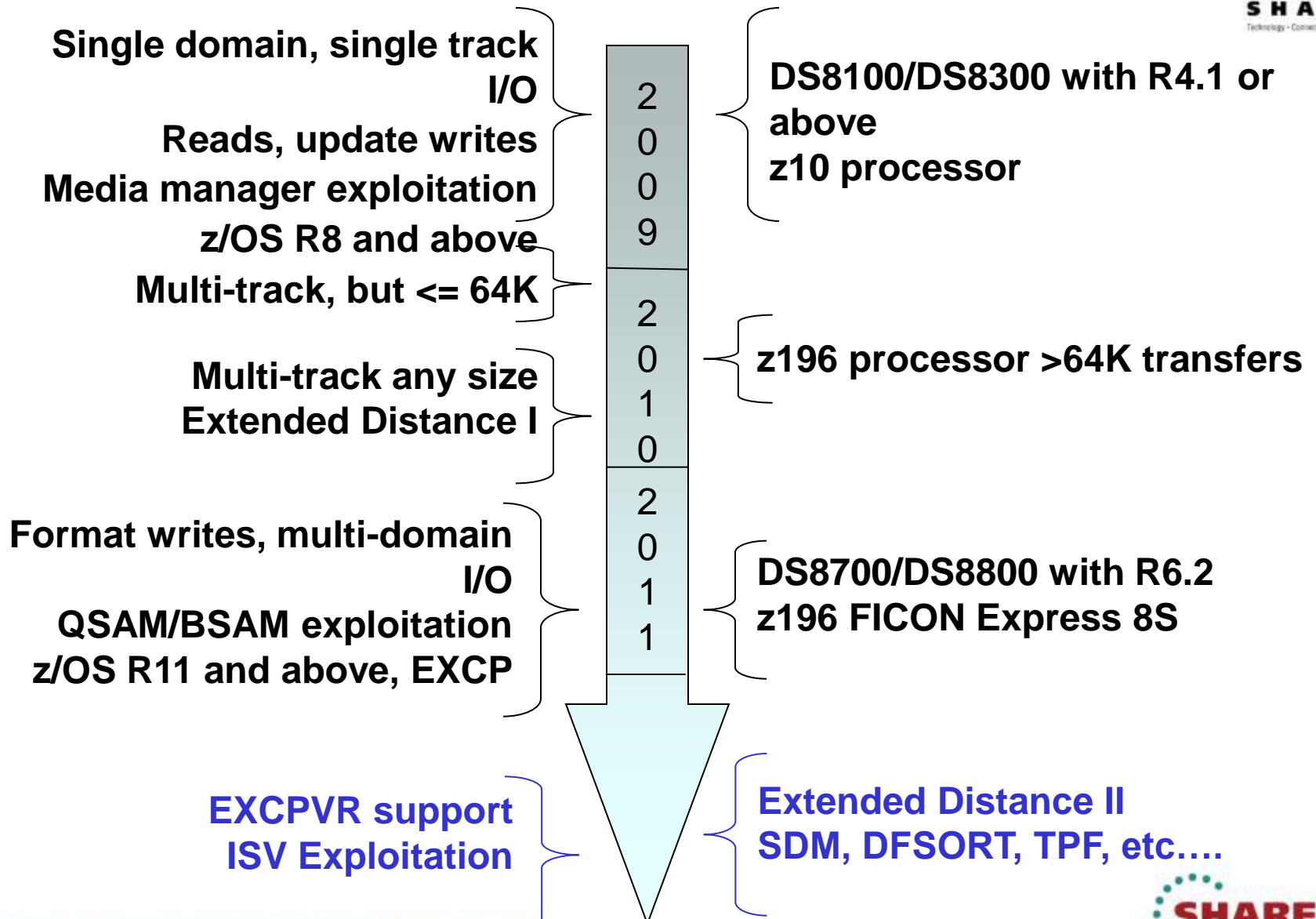
zHPF



IU – Information Unit

zHPF provides a more streamlined link protocol than FICON

zHPF Evolution



100% of DB2 I/O is now converted to zHPF Typical Client will have 90%+ of all DASD I/O converted to zHPF

z/OS Storage Leadership with DS8K

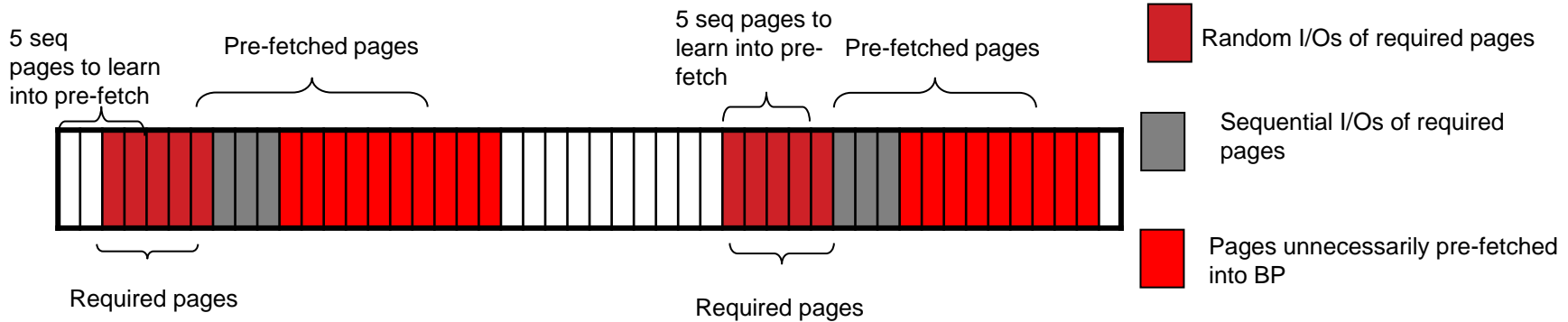
- High Performance FICON (zHPF) extensions for optimal system performance

- Shorter elapsed times for I/O intensive batch reduces batch window
 - New DS8000 I/O commands optimize QSAM, BPAM, and BSAM access methods for exploiting zHPF
 - Benefits non-extended format sequential and basic and large format sequential data sets
 - I/O service times are improved by up to 30%
- Complete conversion of DB2 I/O to zHPF maximizes resource utilization and performance -> Significant Throughput gains in many areas.
 - Format write throughput increases up to 52% (4K pages)
 - Applies to Load, Reorg writes to shadow, Restores
 - DB2 V8 increase only 30%, DB2 9/10 increase up to 52%.
 - Pre-formatting throughput increases up to 100%
 - Sequential pre-fetch throughput increases up to 19%
 - Dynamic pre-fetch throughput increases up to 23% (40% with SSD)
 - Disorganized index scans yield throughput increases up to 111% on DB2 10 (more with 8K pages)
 - DB2 V9 throughput increases up to 43%
 - Together, DB2 10 and zHPF is up to 11 times faster
 - Synchronous I/O cache hit response time decreases by up to 30%
 - Improvements in cache handling decrease response times
 - Skip sequential index-to-data access improves cache miss processing by 3x to 4x
 - Up to 50% reduction in the number of I/O operations for query and utility functions
 - New DS8700/DS8800 R6.2 Algorithm to handle DB2 List-Prefetch I/O feature with the z114, z196 GA2.

Skip Sequential – Dynamic Pre-fetch

DB2 Skip Sequential

- Data may be accessed in a skip sequential manner
 - Gaps between required sequential pages
 - Dynamic pre-fetch learns into pre-fetch after 5 sequential pages
 - Triggering next pre-fetch quantity
- What if application does not need pre-fetched pages?

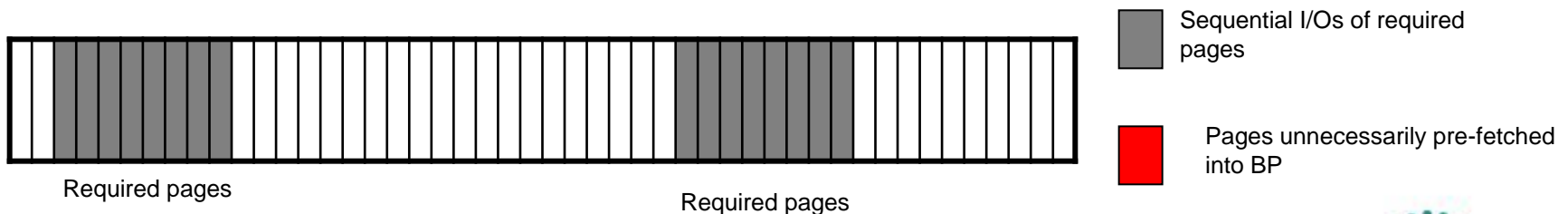


Skip Sequential – DB2 List Pre-fetch

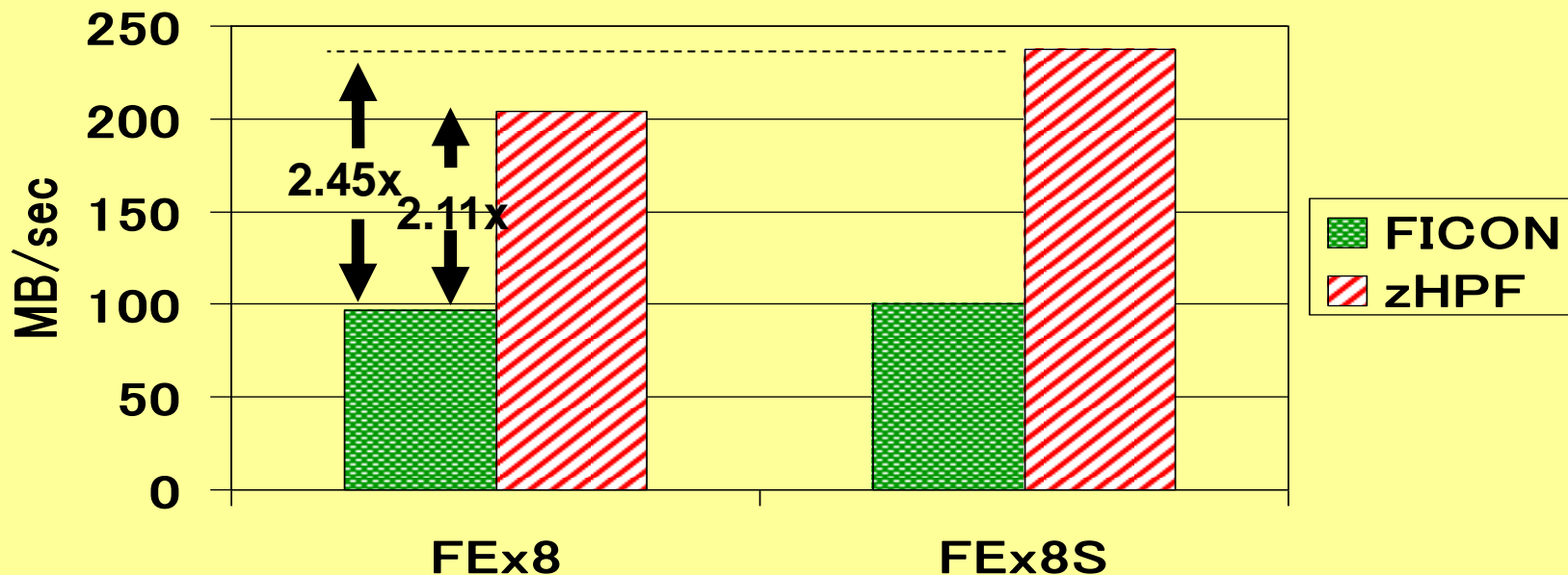
List-prefetch does not need to learn into sequential access

Only those pages required are read into the buffer pool

zHPF List-Prefetch Support can yield 20x I/O Service Time Reduction compared to cache miss
 z/OS DB2 keeps 2 Read I/O Chains Outstanding at a time each reading 32 DB2 Pages -> 64 DB2 Pages read at any PiT by DS8870/DS8800.



List prefetch 32x4K pages from cache FICON Express 8 & 8S



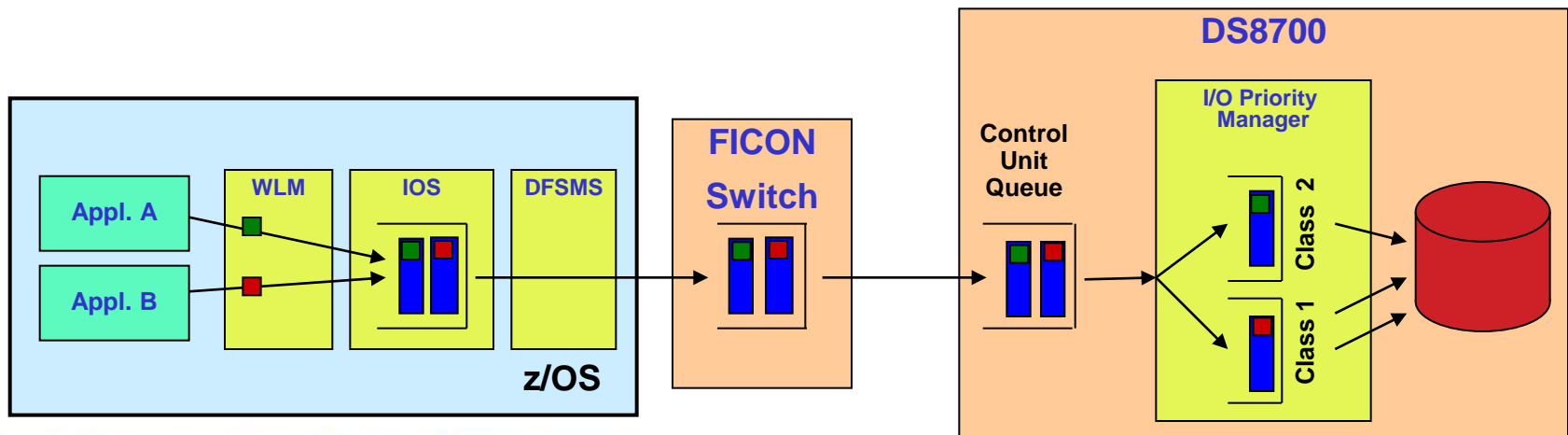
- With FICON Express 8, zHPF increases list prefetch by 111%
- FICON Express 8S adds another 16% (145% more than FEx8 FICON)

DS8K R6.3 zHPF Enhancements

- ✓ **QSAM, BPAM, BSAM & EXCPVR access methods**
- ✓ **All Format Writes across all access methods now zHPF eligible**
- ✓ **Ficon Express 8S -> DB2 List PreFetch (QUERY & Utility Functions) – Further Performance improvements.**
- ✓ **SETSMS SAM_USE_HPF(YES/NO) – Turn function ON/Off.**

WLM Support for I/O Priority Manager in DS8K Series

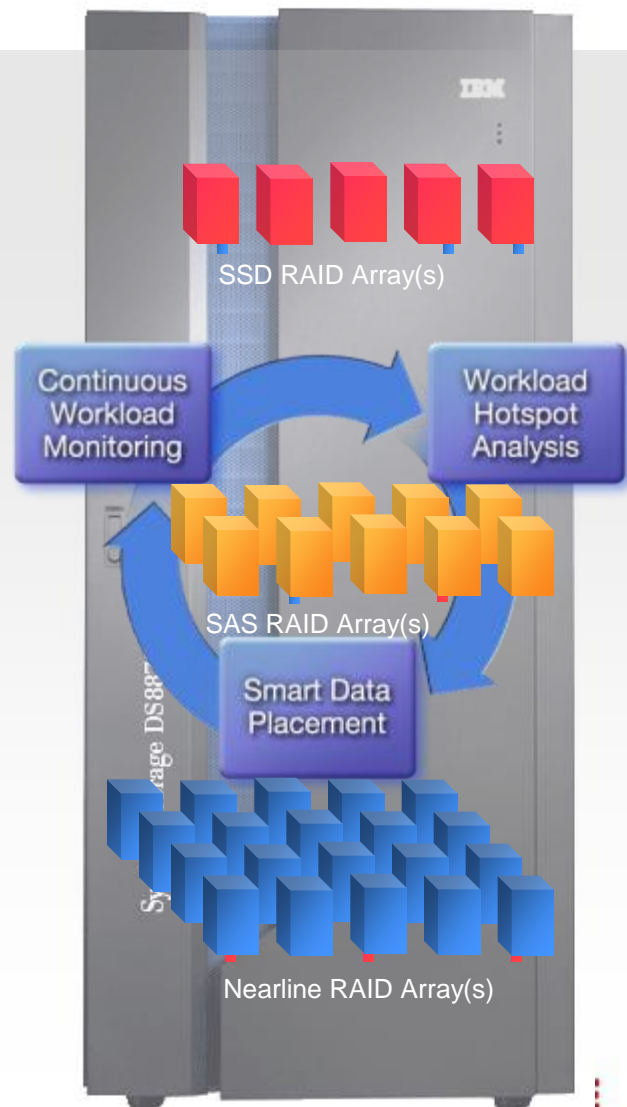
- WLM collaborates with the I/O Priority Manager in DS8K storage servers.
- This feature is supported on IBM System Storage® DS8K series, and requires a DS8K licensed machine code
- WLM sends I/O Priority Manager information about the goal fulfillment and importance of z/OS workloads (service classes).
- Passing these performance parameters to the storage server enables the I/O Priority Manager to determine which I/O requests are more important than others and which I/O requests need to be processed faster to fulfill the performance goals defined for the corresponding workload in z/OS.
- Using the passed information from WLM, the I/O Priority Manager throttles I/O requests of workloads which exceed their goals to help I/O requests of workloads which do not fulfill their goals.
- New IEAOPT parameter `STORAGESERVERMGT={YES|NO}`



DS8870 IBM Easy Tier

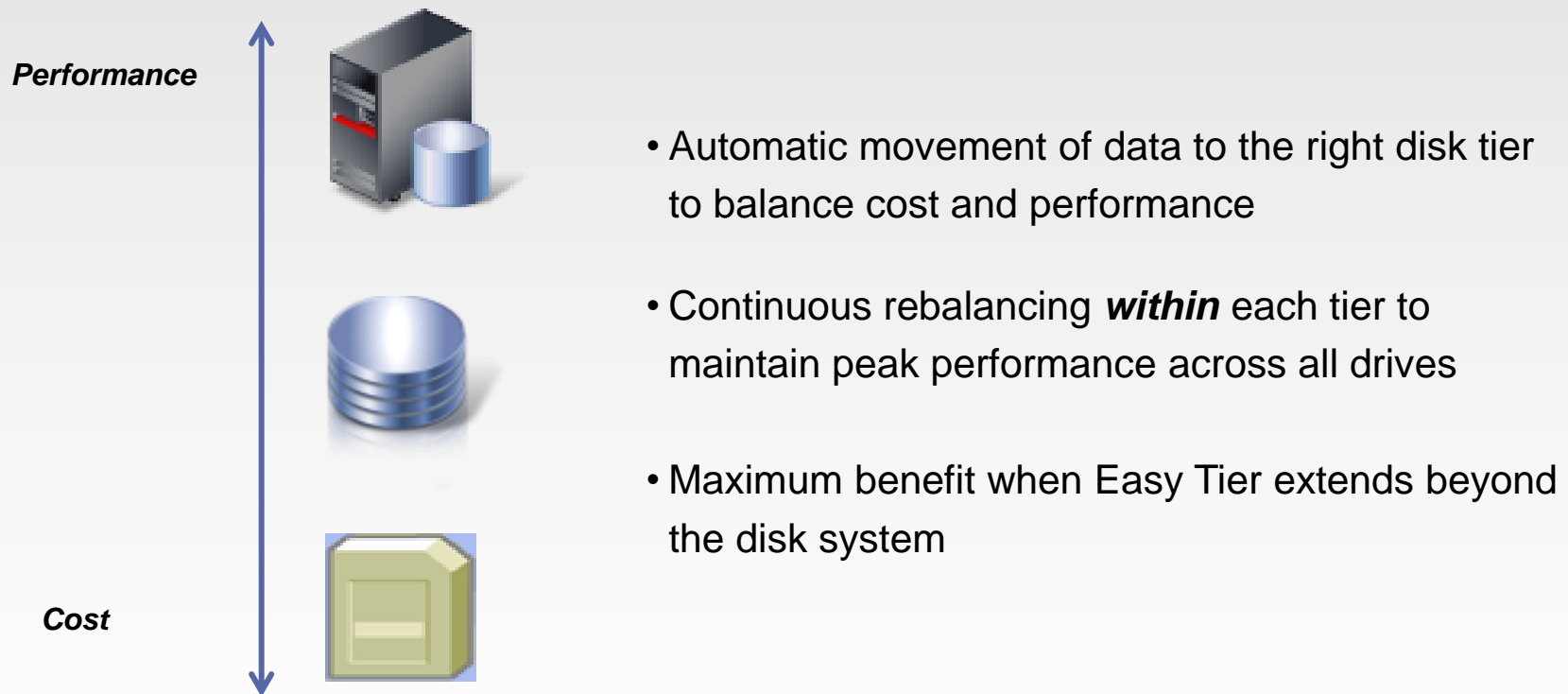
Storage Tier Optimization

- **Monitors performance of each 'extent' (1 GiB, sub-volume level or 3390-1 equivalent) to determine the data 'temperature'**
- **Creates extent migration plan for optimal data placement every 24 hours based on performance statistics**
- **Migrates extents within an extent pool according to plan over 24-hour period**
- **A limited number of extents are chosen for migration every 5 minutes**



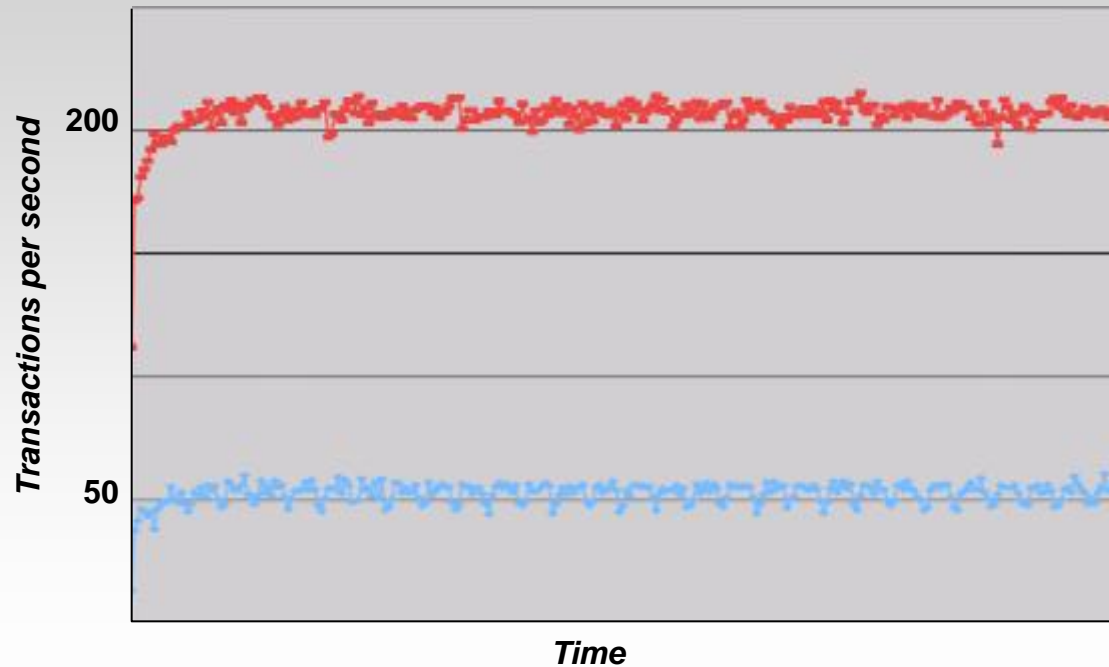
IBM Self-Optimizing Storage with Easy Tier

Easy Tier balances performance and cost automatically



SSD optimization boosts application performance by 4x

Financial Brokerage Application
(Easy Tier with SSD + HDD)



4x

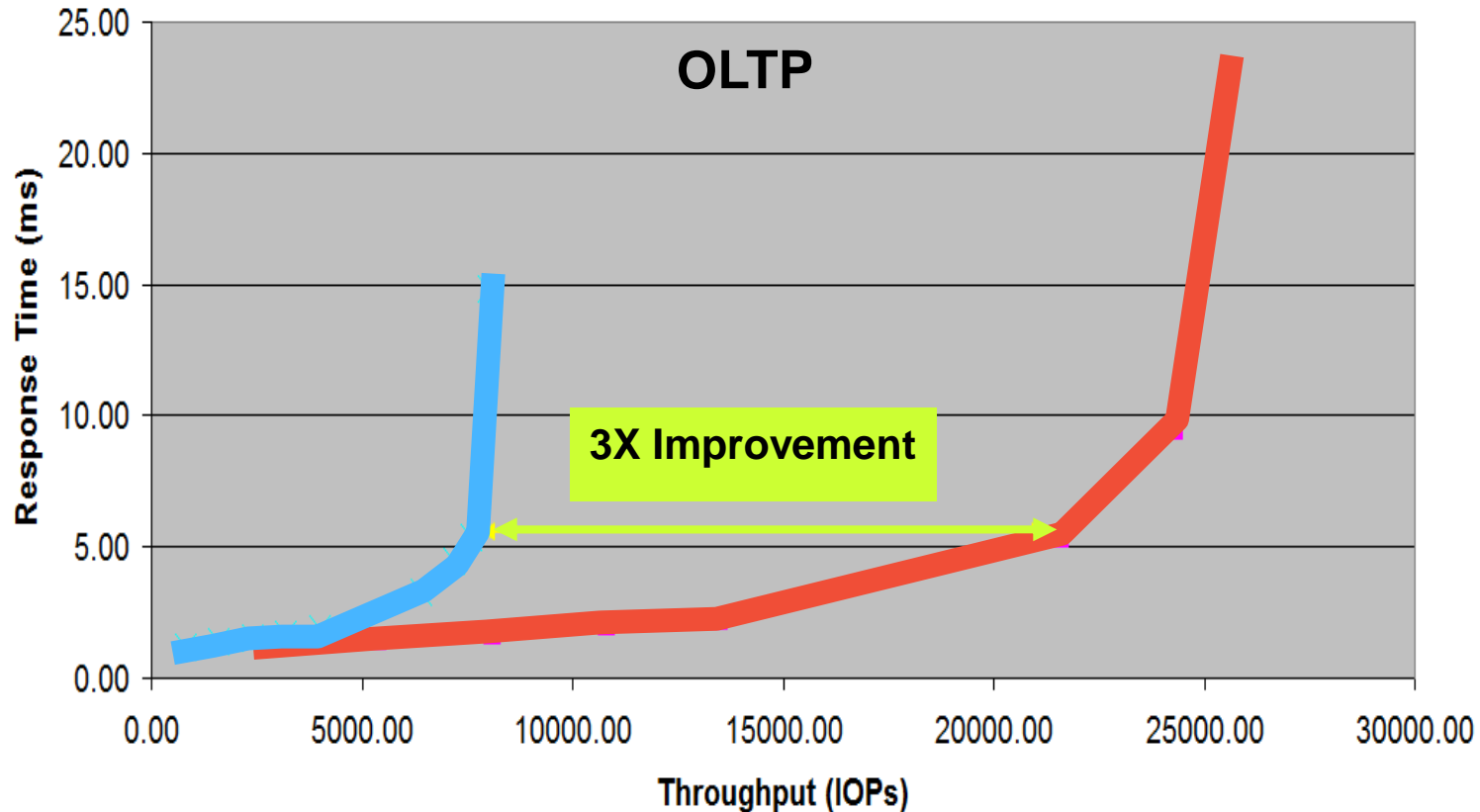
throughput increase
with only

10%

of a database onto SSD

* Internal IBM Performance benchmark testing

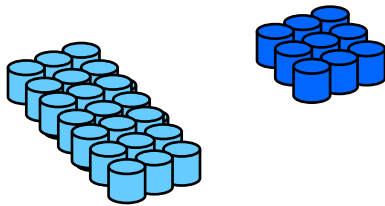
3x performance boost for single-tier optimization And better response times



- 80 15K RPM drives (RAID-5), initially skewed
- 80 15K RPM drives (RAID-5), after auto-rebalance

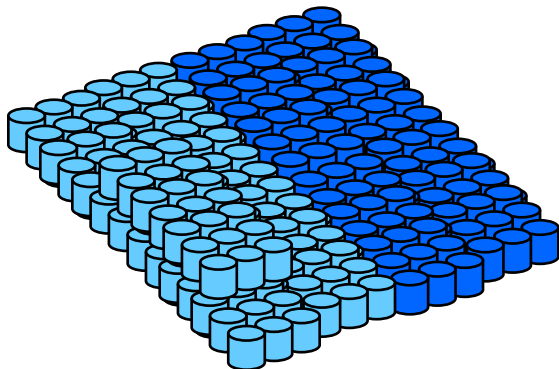
Management & Growth

Lets Review - “I am Running Out of UCBs”



Subchannel Set 1

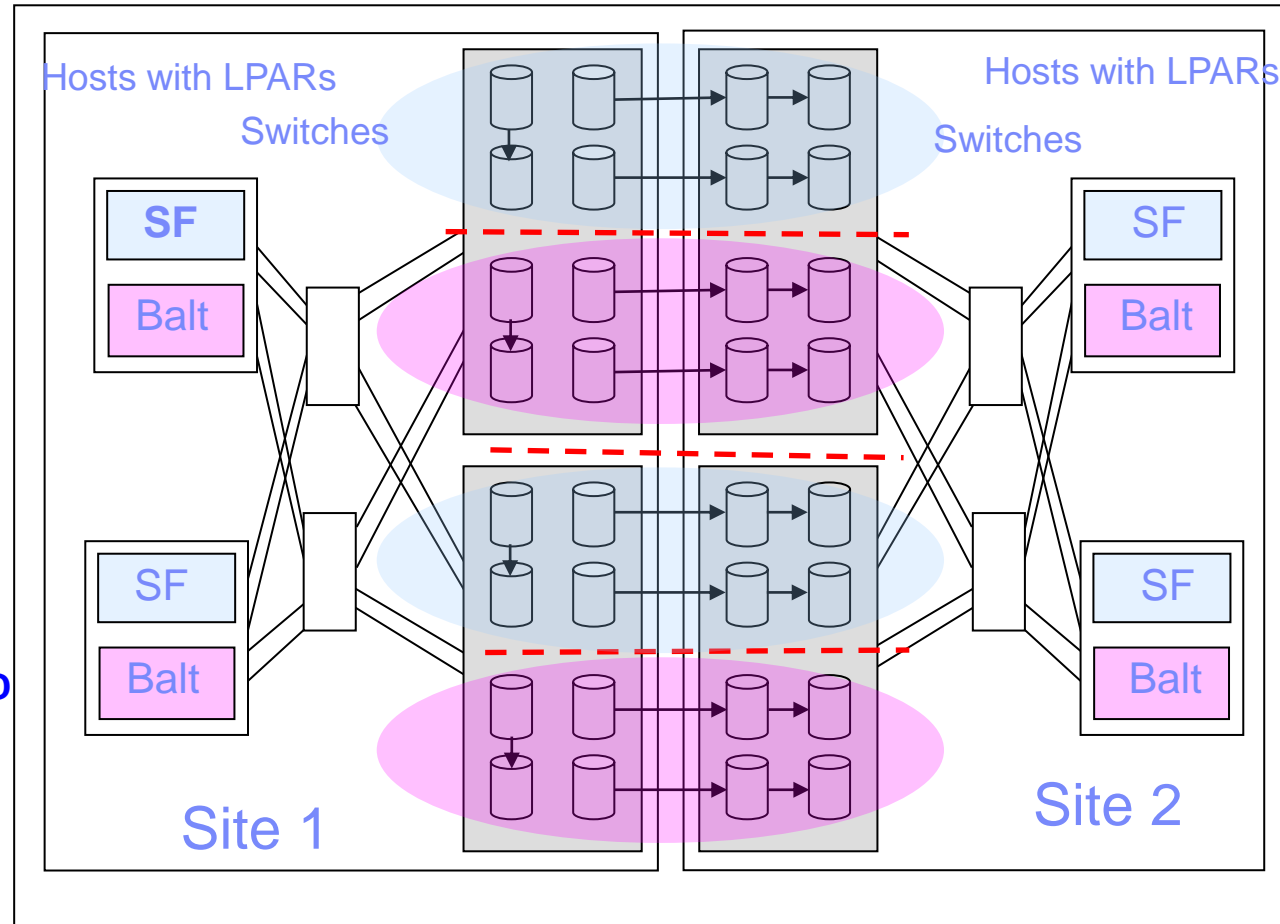
Subchannel Set 0



- **Alternate Subchannel Set Exploitation**
 - **50% reduction in device numbers**
- **HyperPAV**
 - **10x reduction in PAV devices by assign PAV aliases on demand as the work load requires**
 - **PAV-aliases virtualized across operating system images for more efficient use on addressing constructs**
- **Extended Addressability Volumes**
 - **223 GB Volume & Now 1TB volume Sizes**
 - **Reduce system resources and overhead with managing fewer resources**
- **Dynamic Volume Expansion**
 - **Without copy services intact**
- **MIDAWs**
 - **Performance enhancement for using larger datasets**
- **TDMF and zOSDMC (aka LDMF)**
 - **Non-disruptively consolidate data on to a single larger volume and consolidate device number ranges**
- **PPRC Secondary's in Alt Subchannel Set w/HyperSwap**

Multi-tenancy copy services environment

- **Functionality to provide policy-based limiting of copy services functions in multi-tenancy environment**
- **General customers can utilise delivery to create large partitions to prevent copy services operator errors from escaping a given partition**
- **Requirement**
 - **Limiting of tenant copy services operations to tenant's domain**
 - **Tenant DS8000 user ID with Copy Services Operator authority using copy services**



Business Continuity – Availability & Disaster Protection

Storage Based Data Replication Enabling Core Technologies



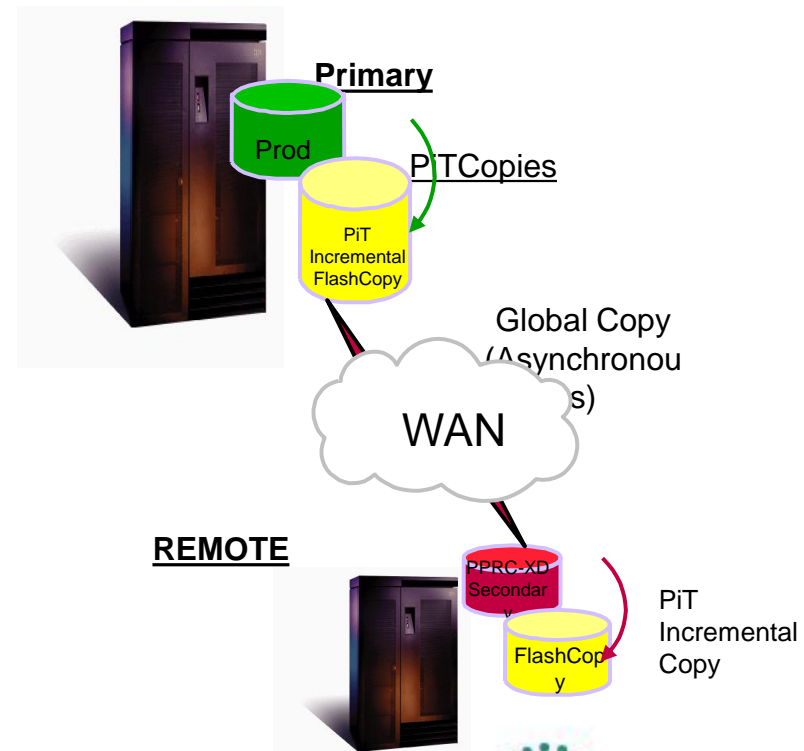
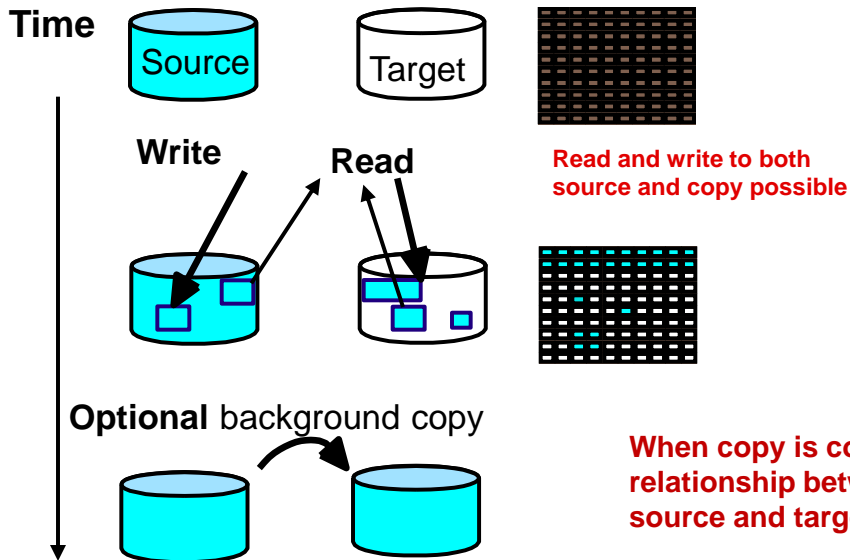
- FlashCopy
- Internal Copy
- Available on:
 - DS6000, DS8000, ESS
 - SAN Volume Controller
 - DS4000, DS400, DS300, XIV

PiT Incremental FlashCopy

+ Metro Mirror

Available on:

DS6000, DS8000, ESS



FlashCopy Client Scenarios

- FC Targets are a GC Source (Send to remote site)
- zCDP for DB2, zCDP for IMS
- Fast Batch Restart After Batch Failure
- FlashCopies for Backups/Clones etc
 - **Consistent FlashCopies**
 - **Backups -> PiT FlashCopy off MM, GM, zGM Targets**
 - Data Freeze MM -> PiT FlashCopy Target Devices
 - Remote Pair FlashCopy
 - Pause GM -> FC target Devices
 - zGM (XRC) Zero Suspend FC
- FlashCopy as an Acceleration Function
 - **Fast Defrag**
 - **DB Utilities**

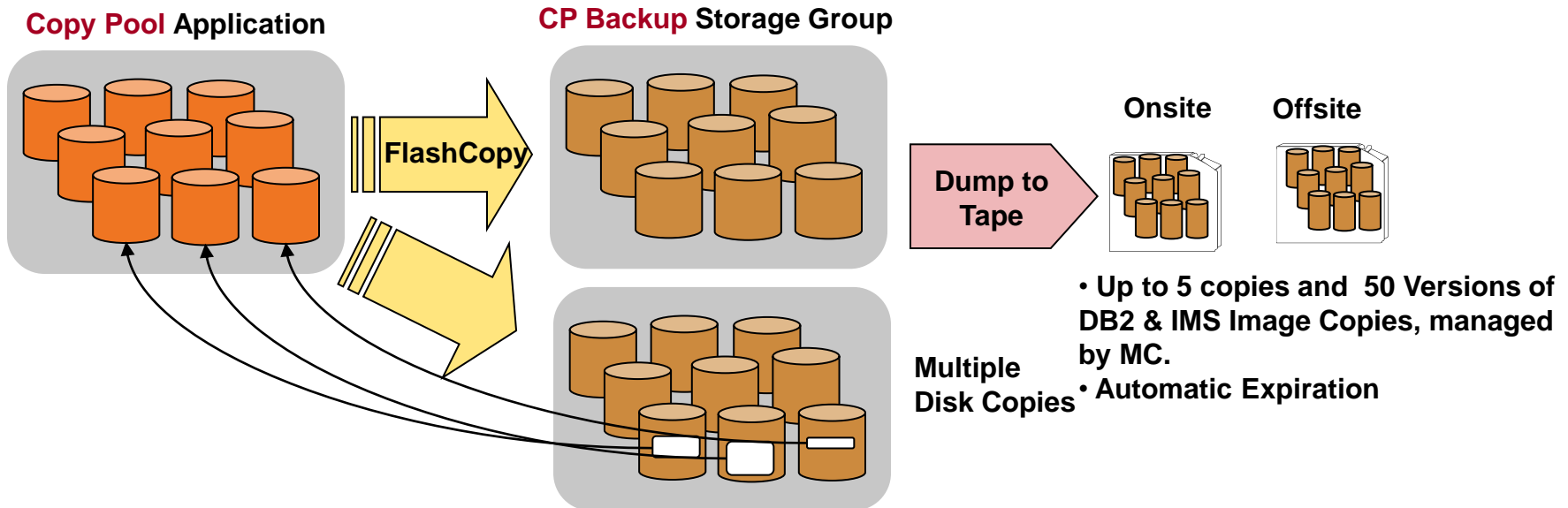
zCDP for DB2 & zCDP for IMS – Eliminate Backup Windows

DB2 & IMS System Level Backup & System Level Restore

- Backup calls HSM with DB Tables, HSM FlashCopy to SMS Copy Pool, then DB Logs.
- DB2 & IMS Maintain Cross Volume Data Consistency. No Quiesce of DB required.

DFSMSHsm function that manages Point-in-Time copies

- Combined with DB2 BACKUP SYSTEM, provides non-disruptive backup and recovery to any point in time for DB2 & IMS databases and subsystems (SAP)



★ Recovery at all levels from either disk or tape!

- Entire copy pool, individual volumes and ...
- Individual data sets

IBM DS8000 Feature - Remote Pair FlashCopy

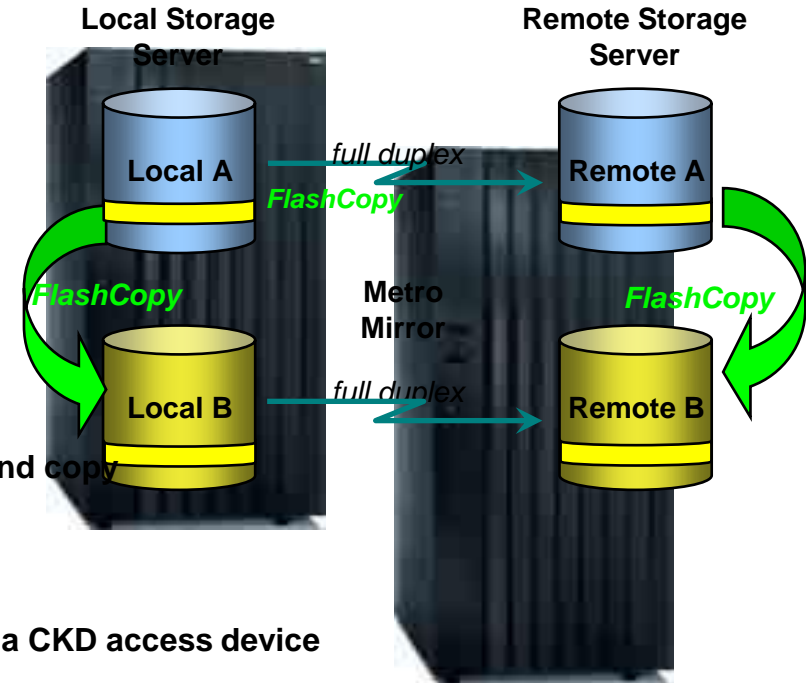
(ex. GDPS/PPRC HS + FlashCopy)

Function: FlashCopy to PPRC Source, send FC command to target instead of all data (Duplex Pending). Maintains HyperSwap being Active.

(Ex. zCDP for DB2 Backups at both Sites w/HyperSwap.)

Scope & Restrictions:

- Full volume and data set level operations
 - IBM Remote Copy FC can be combined with:
 - Incremental FlashCopy
 - Background copy or no background copy
 - Nocopy to copy
 - FlashCopy consistency groups
 - FlashCopy of open devices using a CKD access device
- FlashCopy features not supported with Preserve Mirror function:
 - Commit, Revert, Fast Reverse Restore
 - Space Efficient FlashCopy (Source or Target)
- Local target and remote target cannot be space efficient
- Both PPRC pairs must be Metro Mirror pairs in full duplex
- Withdraw of Preserve Mirror relationship will cause bit to be set for PPRC pair at target indicating not true mirror while still full duplex
- Function will be provided with REQUIRED and PREFERRED options



Storage Based Data Replication Enabling Core Technologies

➤ Metro Mirror

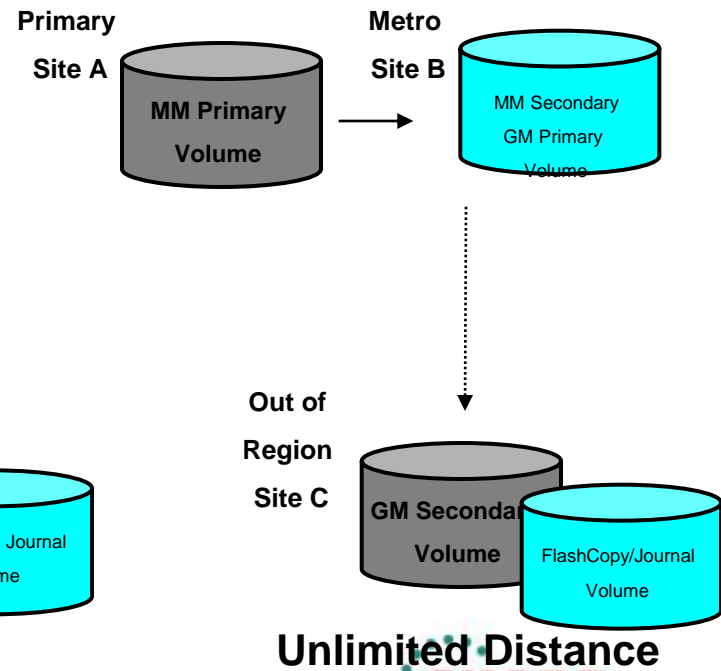
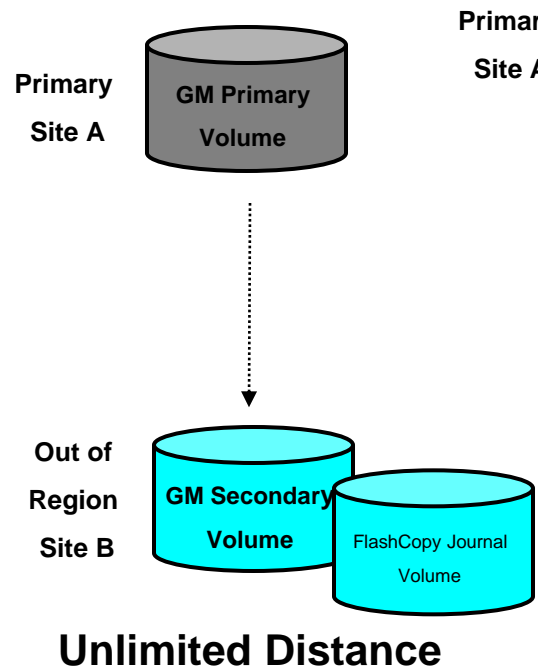
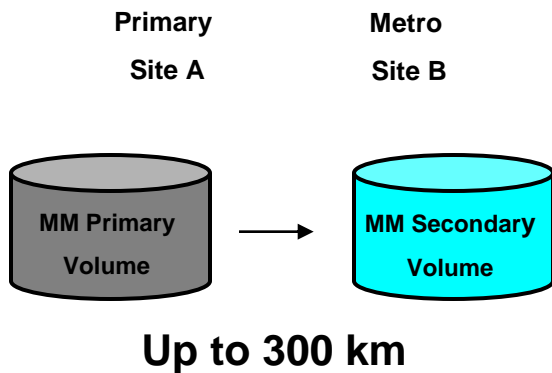
- Synchronous mirroring
- Available on:
 - DS6000, DS8000, ESS
 - SAN Volume Controller
 - DS4000, DS400, DS300,
 - XIV

➤ Global Mirror

- Asynchronous mirroring
- Available on:
 - DS6000, DS8000, ESS
 - DS4000, DS5000
 - XIV

➤ Metro Global Mirror

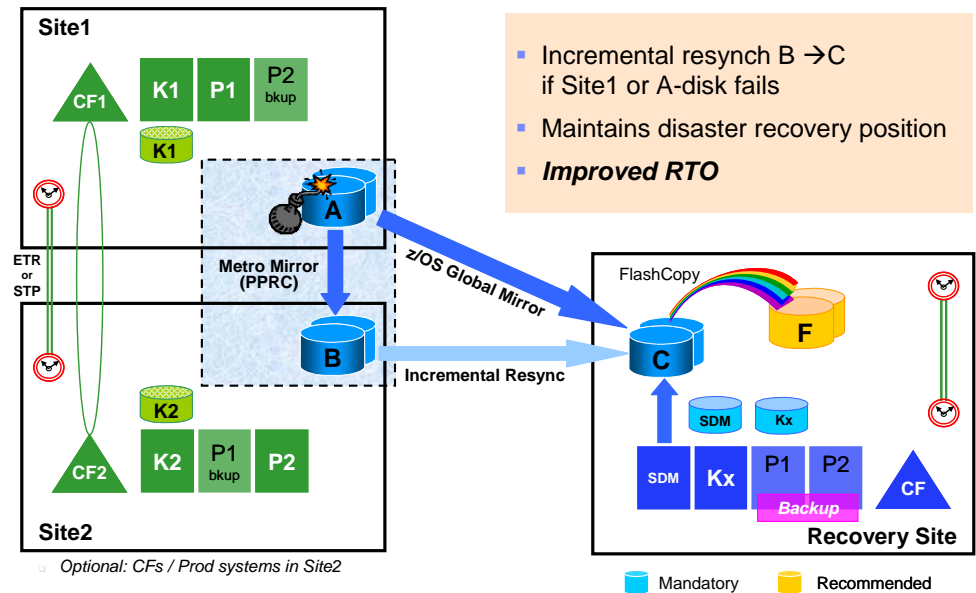
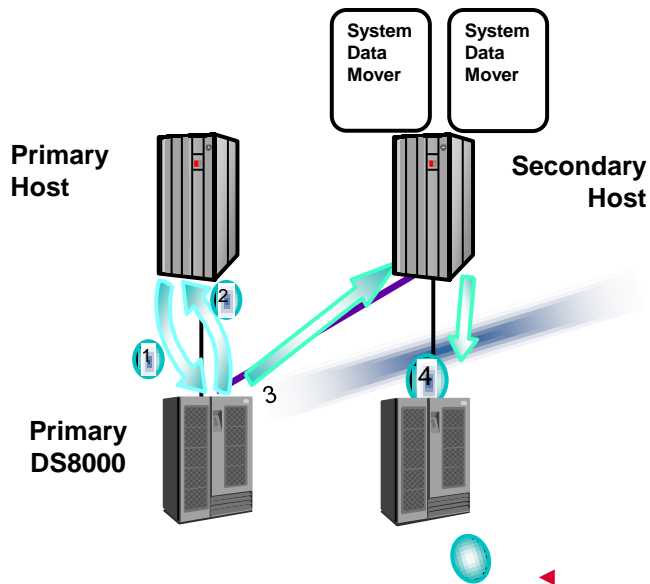
- Three site synchronous and asynchronous mirroring
- DS6000, DS8000



DS8870 System z - Storage Based Data Replication Enabling CoreTechnologies

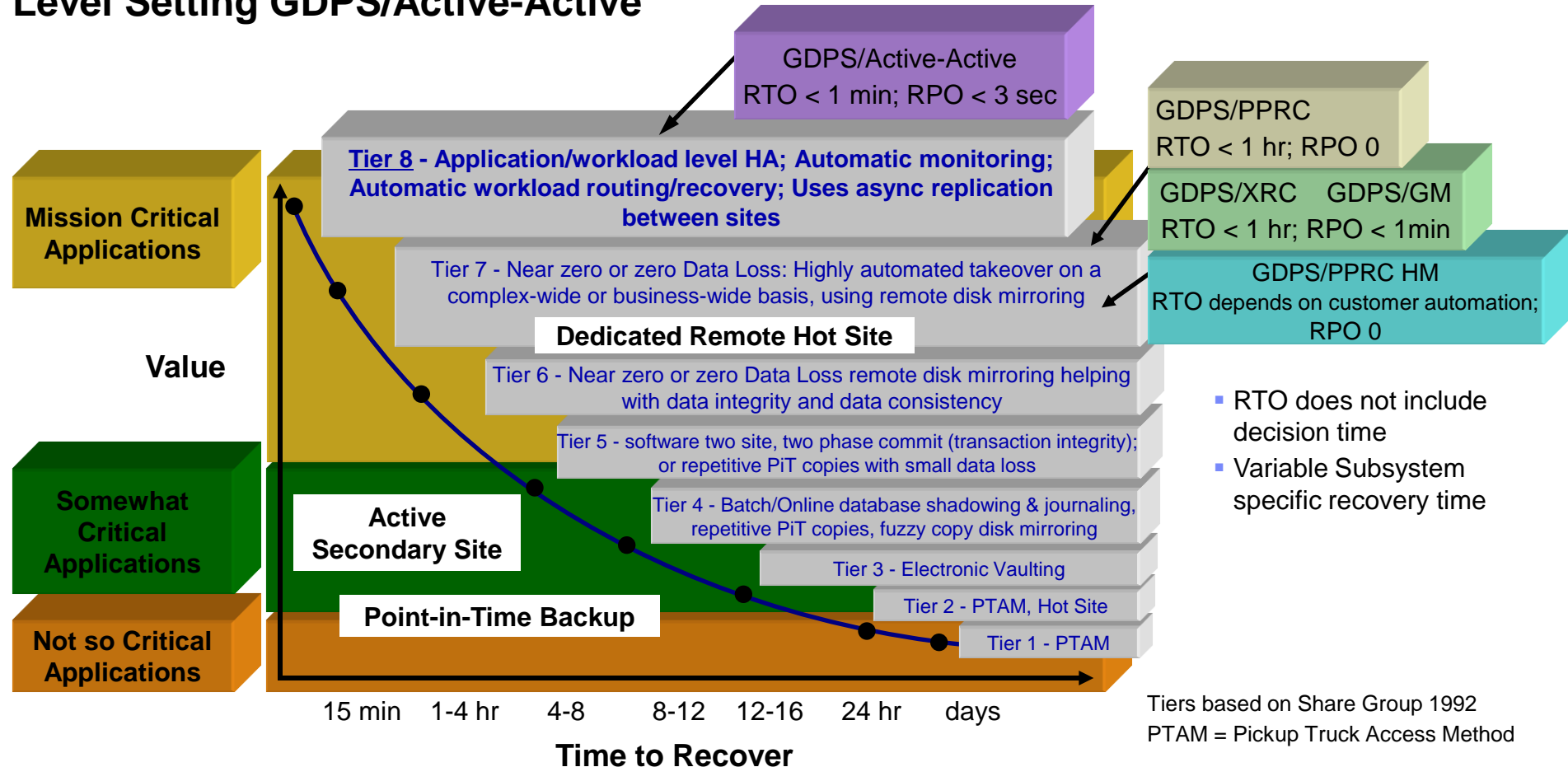
- z/OS Global Mirror (XRC)
 - Asynchronous mirroring – System z ONLY)
 - Available on DS8000 & ESS

- z/OS Metro Global Mirror (MzGM)
 - Asynchronous mirroring – System z ONLY)
 - Available on DS8000



Tiers of Disaster Recovery

Level Setting GDPS/Active-Active

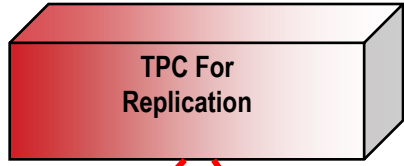


Failover models can only achieve so much in improving RTO

TPC Replication Manager

- Setup Copy Sessions
- Execute Copy Operations
- Monitor Copy Status
- Manage/Monitor Consistent Groups
- Alert Operations on Exceptions / Failures

- DS6000, DS8000 SVC & XIV support
- Global Mirror Support
- Replication Progression Monitoring
- High Availability
- Disaster Recovery Automation (failover, failback)



Primary/Source Site

Second/Target Site



- Automated copy services configuration
- Central operations for copy services
- Operational status on copy services operations
- Assistance with recovery on failures



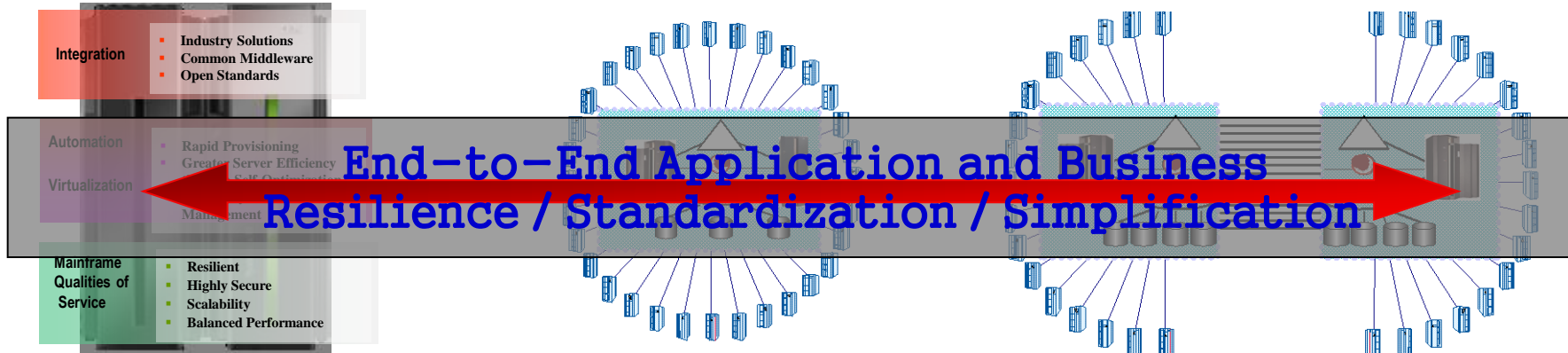
System z Availability Spectrum



System z196/zEC12

Parallel Sysplex

GDPS



- Scalability
- Built-In Redundancy
- Policy Based Workload Mgt. (WLM)
 - Multiple Workloads / higher utilization
- Dynamic Provisioning
 - CoD, CIU, CBU, OOCoD, CPM
 - Dynamic PU reassignment
 - HiperDispatch
- Virtualization
 - LPARs (60)
 - zVM/LINUX – 100 LINUX Servers
 - HyperSockets – network in a box
- Concurrent Maintenance
- Linux IFL / zAAPs, zIIPs
- w/ICF – Clustering in a Box
- CEC, Disk, Data are SPOFs

- “Shared Everything”
- Single Image/Single Point of Control
- Near Continuous Application Availability
 - Protection from SW/HW Failures
 - Address Planned/Unplanned Outages
 - Rolling IPL’s
- Flexible, Non-disruptive Growth
- Scale out – 1 -32 Systems
 - Scales better than SMPs
- Dynamic Workload/Resource Management
 - WLM (based on business priorities)
 - IRD, CPM
- Infrastructure Simplification
- Disk and Data are a SPOF

- Protects against site failures
 - Planned or Unplanned
- Autonomic / Automated
 - RTO < 2hours
- Metro/Global data mirroring
 - Sync (PPRC) – 100km
 - Async (XRC) – any distance
- HyperSwap
 - Protects against disk failures
 - zOS, and zLinux under zVM
- Business Policy based
 - No/Some Data Loss
- Application Independent

GDPS Solutions

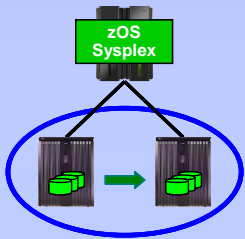
There are multiple GDPS service products under the GDPS solution umbrella to meet various customer requirements for Availability and Disaster Recovery

GDPS/PPRC HM

Continuous Availability of Data within a Data Center

Single Data Center
Applications remain active

Continuous access to data in the event of a storage subsystem outage



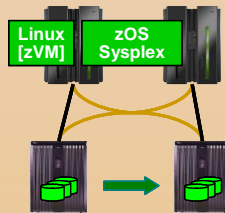
RPO=0 & RTO=0

GDPS/PPRC

Continuous Availability / Disaster Recovery within a Metropolitan Region

Two Data Centers
Systems remain active

Multi-site workloads can withstand site and/or storage failures

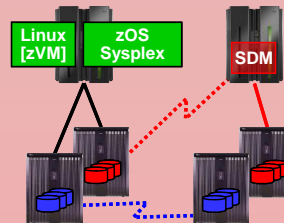


A/S RPO=0 & RTO<1 hr or
A/A RPO=0 & RTO mins

GDPS/GM & GDPS/XRC

Disaster Recovery at Extended Distance

Two Data Centers
Rapid Systems Disaster Recovery with "seconds" of Data Loss
Disaster recovery for out of region interruptions

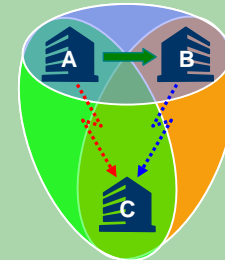


RPO secs & RTO <1 hr

GDPS/MGM & GDPS/MzGM

Continuous Availability Regionally and Disaster Recovery Extended Distance

Three Data Centers
High availability for site disasters
Disaster recovery for regional disasters



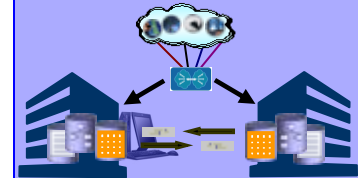
A/S RPO=0 & RTO<1 hr or
A/A RPO=0 & RTO mins
and RPO secs & RTO <1 hr

GDPS/Active-Active

Continuous Availability, Disaster Recovery, and Cross-site Workload Balancing at Extended Distance

Two or More Data Centers

All sites active



RPO secs & RTO secs

Components

Tivoli – NV, SAz
STG – System z, DS8K, PPRC
GTS – GDPS code, Services

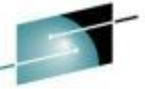
Tivoli – NV, SAz, SA MP, AppMan
STG – System z, DS8K, PPRC, VTS
GTS – GDPS code, Services

Tivoli – NV, SAz
STG – System z, DS8K, GM, XRC
GTS – GDPS control, Services

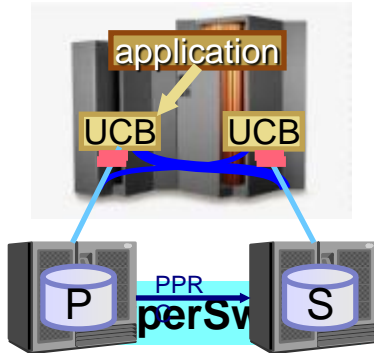
Tivoli – NV, SAz
STG – System z, DS8K, MGM, MzGM
GTS – GDPS code, Services

Tivoli – NV, SAz
AIM – Multi-site Workload Lifecycle
IM – DB2 & IMS replication
STG – System z, DS8K, GC
GTS – GDPS code, Services

IBM HyperSwap Technology: Near Continuous Data Availability



SHARE
Technology • Connections • Results



- ✓ Designed to Provide Continuous Availability of Data for System z
 - ✓ Facilitated by new PPRC microcode functionality and z/OS® IOS code
 - HyperSwap™ is:
 - ✓ Integration of very fast swapping of PPRC'd disk subsystems with z/OS, System z hardware, and GDPS or TPC-R.
 - ✓ Switching to alternate copy of System z data can be accomplished in seconds to minutes
 - ✓ Supported on Synchronous PPRC
 - ✓ HyperSwap Options:
 - ✓ z/OS Basic HyperSwap,
 - ✓ TPC-R Full Function HyperSwap,
 - ✓ GDPS HyperSwap Manager
 - ✓ GDPS/PPRC w/HyperSwap Full Function
- ✓ Intended Benefits:
 - ✓ Designed to offer continuous availability of data
 - ✓ Disk Maintenance
 - ✓ Site Maintenance
 - ✓ Data Migration
 - ✓ Disk Failure
 - ✓ Site Failure
 - ✓ Fast and Scalable System z Enterprise Data Center swap: scales to very large configurations
 - ✓ Repeatable, reliable, confident recovery: No operator interaction,
 - ✓ Alternate Subchannel Exploitation
 - ✓ Remote Pair FlashCopy Exploitation

DS8700/DS8800 R6.2 New Function:

Hyperswap Synergy zOS Resilience (Health Status Message)

Improves detection of when to trigger a Hyperswap. Provides a mechanism for the DS8K to alert the host of specific events that may cause an adverse effect to host operations. These messages indicate to GDPS that action may need to be taken in order to preemptively avoid problems on this controller and to swap to the secondary DS8K.

Link Summary Event Notification

Improves detection and handling of PPRC Suspend. Allows for the DS8K to notify all hosts connected to a single LSS for a PPRC suspend event that spans across multiple volumes in that LSS through a single summary notification mechanism.

z/OS Active / Active at Distance – Concept & Value

- Active/Active Sites is positioned as the next generation of GDPS
- Sites separated by unlimited distances, running same applications and having the same data to provide cross-site Workload Balancing and Continuous Availability / Disaster Recovery
- Customer data at geographically dispersed sites kept in sync via replication
- Configurations: Active/Standby, Active/Query (SOD)

GDPS/PPRC

Failover Model

Recovery Time \approx 2 min

Distance < 20 km
sites

GDPS/XRC or GDPS/GM

Failover Model

Recovery Time < 1 hour

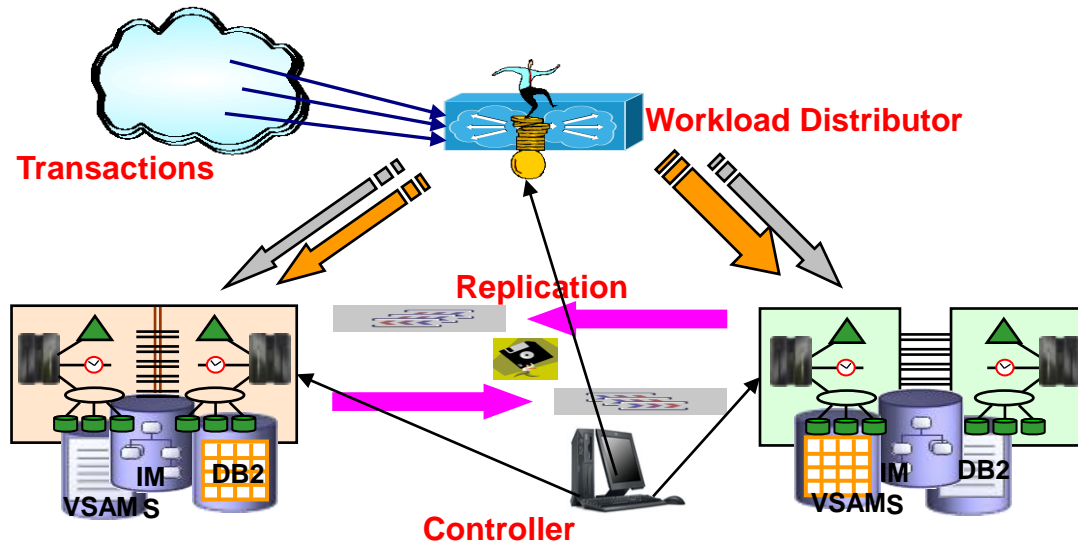
Unlimited distance

Active/StandBy

Near CA model

Recovery time < 1 minute

Unlimited distance between



 #SHAREorg

Summary



Distributed Systems and DS8000 Synergy Items

- **Pre-Deposit Write (Copy Services one protocol exchange & Keeps Pipe Full)**
- **Caching Algorithms – AMP, ARC, IWC 4K Cache Blocking**
- **Easy Tier**
- **I/O Priority Manager**

Performance

- **HyperSwap (AIX)**
- **GDPS x/DR, GDPS DCM**
- **Power HA p, Power HA i**
- **Remote Pair FlashCopy & Enhancements**
- **FlashCopy & Functions like Fast Reverse Restore**

Availability

- **Dynamic Volume Expansion**
- **Thin Provisioning**
- **Space Efficient FlashCopy**
- **z/OS Distributed Data Backup**
- **Disk Encryption**

Management/Growth

z/OS and DS8000 Synergy Items

- **zHPF Enhancements (now includes all z/OS DB2 I/O)**
- Extended Distance FICON
- Caching Algorithms – AMP, ARC, IWC, 4K Cache Blocking
- DFSMS Recognition of SSDs
- Easy Tier
- z/OS GM Multiple Reader Support
- SSDs + DFSMS + zHPF + HyperPAV + DB2
- I/O Priority over Ficon & within DS8K managed by zWLM Service Class
- **zWLM + DS8K I/O Priority Manager**

- HyperPAV
- GDPS & GDOC Automation
- GDPS/Active/Standby
- **HyperSwap Technology Improvements**
- **Remote Pair FlashCopy & Enhancements**
- zCDP for DB2, zCDP for IMS – Eliminating Backup Windows

- **1 TB EAVs**
- **Quick Init for CKD Volumes**
- Dynamic Volume Expansion
- Space Efficient FlashCopy
- z/OS Distributed Data Backup
- System z Discovery & Automatic Configuration (zDAC)
- Alt Subchannel Exploitation
- Disk Encryption

Performance

Availability

Management/Growth

RED – DS8700/DS8800 R6.2 LIC

Additional Information, References, Disclaimers and Trademarks etc.

References

- TechDocs White Paper: IBM Handbook on Using DS8000 Data Replication for Data Migration - <http://www.ibm.com/support/techdocs/atmastr.nsf/WebIndex/WP101716>
- TechDocs White Paper: IBM z/OS Multi-Site Business Continuity <http://www.ibm.com/support/techdocs/atmastr.nsf/WebIndex/WP101635>
- TechDocs White Paper: IBM DS8800 Data Consolidation <http://www.ibm.com/support/techdocs/atmastr.nsf/WebIndex/WP102100>
- TechDocs White Paper: IBM HyperSwap Technology April 2010 <http://www.ibm.com/support/techdocs/atmastr.nsf/WebIndex/WP101289>
- TechDocs White Paper: IBM System z and DS8000 z/OS Synergy <http://www.ibm.com/support/techdocs/atmastr.nsf/WebIndex/WP101528>
- Techdocs White Paper: IBM z/OS Data Corruption Trends & Directions <http://www.ibm.com/support/techdocs/atmastr.nsf/WebIndex/WP101804>
- Redpaper: IBM Storage Infrastructure for Business Continuity <http://www.redbooks.ibm.com/abstracts/redp4605.html?Open>
- Redpaper: IBM System Storage DS8700 Easy Tier <http://www.redbooks.ibm.com/Redbooks.nsf/RedpieceAbstracts/redp4667.html?Open>

Additional Information

- **Web sites:**
 - GDPS** www.ibm.com/systems/z/gdps
 - Parallel Sysplex** www.ibm.com/systems/z/pso
 - Bus Resiliency z** www.ibm.com/systems/z/resiliency
 - Bus Resiliency** www.ibm.com/systems/business_resiliency
 - System z** www.ibm.com/systems/z/hardware
 - Storage** www.ibm.com/systems/storage

- **Redbooks®** **GDPS Family: An Introduction to Concepts and Capabilities**
www.redbooks.ibm.com/abstracts/sg246374.html?Open

- **GDPS Web Site White Papers and Presentations**
 - **GDPS: The Ultimate e-business Availability Solution**
 - **IBM Implementation Services for GDPS/Global Mirror**
 - **GDPS Business Continuity Solutions**
 - **Consistency Groups in a Nutshell**
 - **DS6000™ / DS8000™ Data Replication**
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