

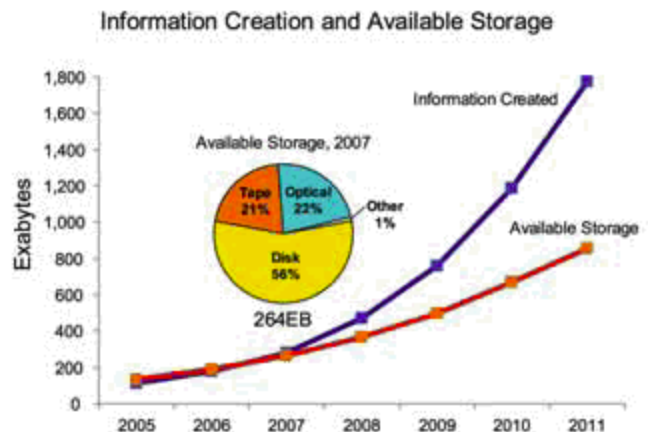
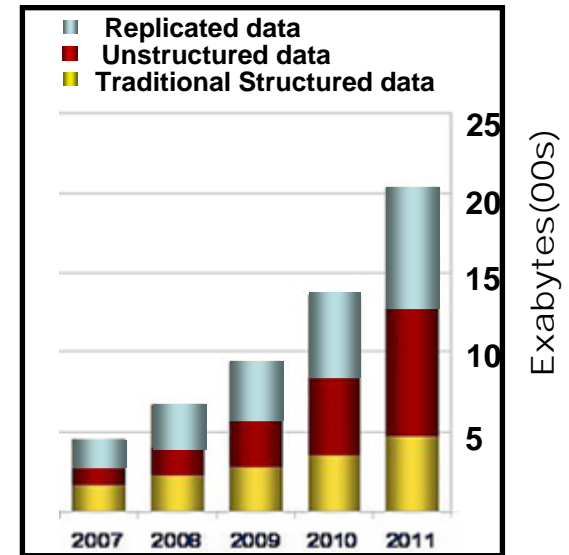


# **System z Enables Solutions For A Smarter Planet**

Handling The Information Explosion

# Data Volumes Are Exploding ...

- Information is doubling every 18 months
  - ▶ Structured data growing at 32%
  - ▶ Unstructured data growing at 63%
  - ▶ Replicated data growing at 49%
- IDC predicts by 2011, digital data will be ten times its size in 2006
- We now create more data than we can store
  - ▶ By 2011, half of the data created will not have a permanent home



Sources: IDC worldwide enterprise disk in Exabytes from "Changing Enterprise Data Profile", December 2007 and "The Diverse and Exploding Digital Universe", March 2008

# Massive Amounts Of Data Present Challenges To Datacenters

- Lots of data means lots of devices
  - ▶ Growing costs for hardware and management
- Data comes in different forms
  - ▶ High value online
  - ▶ Older, infrequently referenced
  - ▶ Archived
- Requirements to move data
  - ▶ Jobs that process data need high I/O bandwidth
  - ▶ Synchronization requirements

# Too Much Data!

**Business growth and new regulations on data retention have our data growing out of control!**



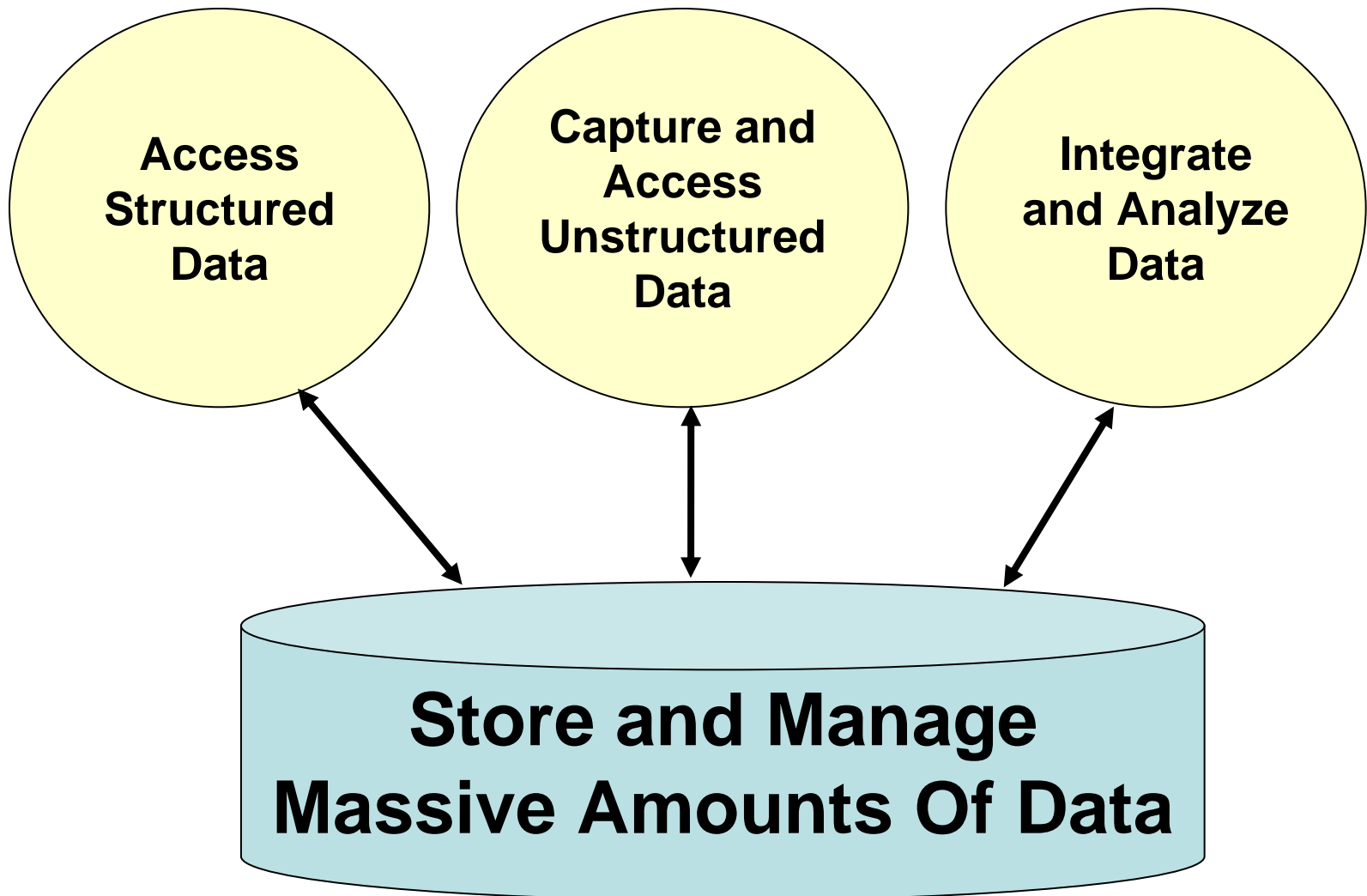
**Service Oriented Finance  
CIO**

**You need a smarter information management strategy.**

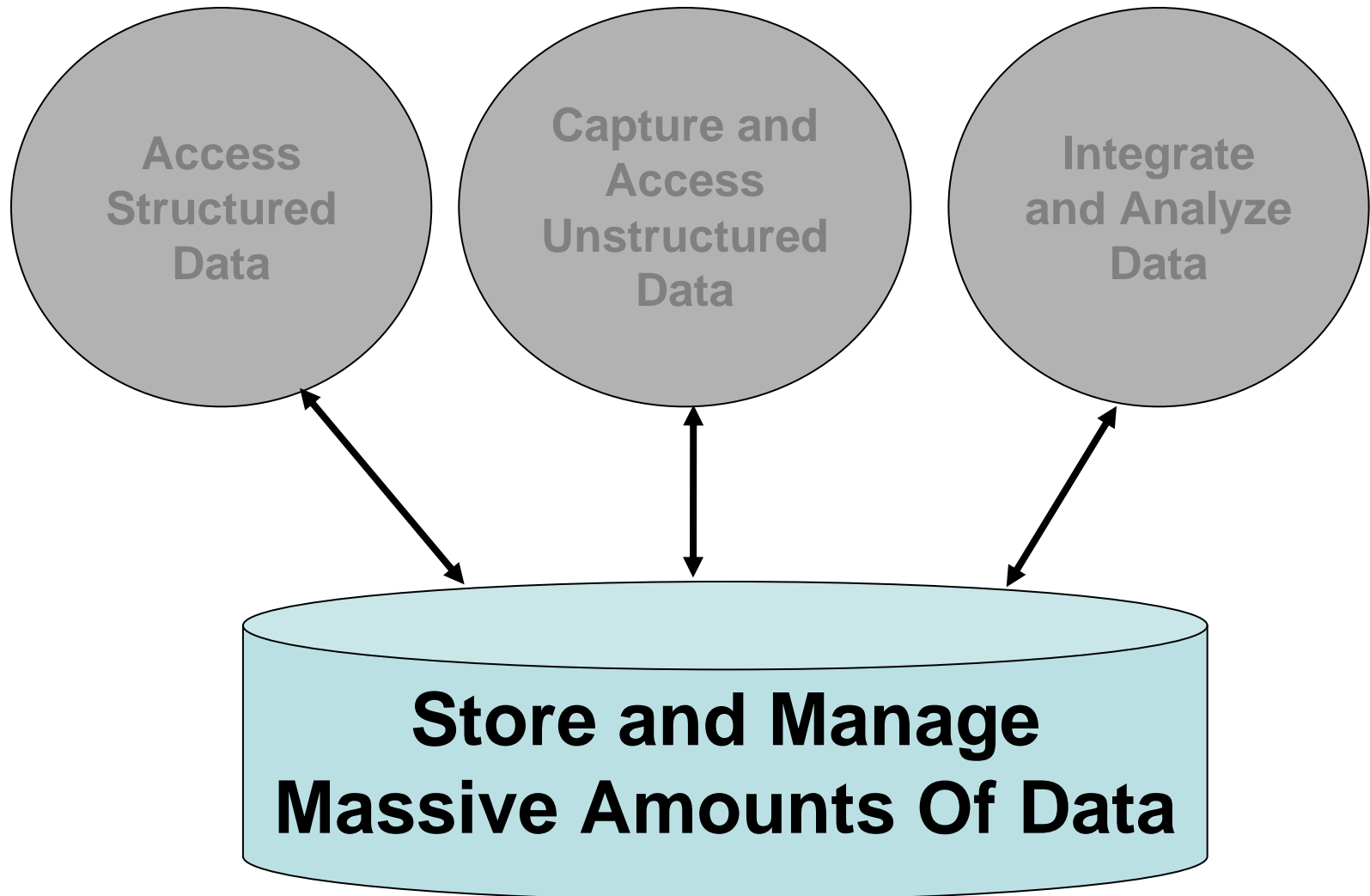


**IBM**

# A Smarter Information Management Strategy

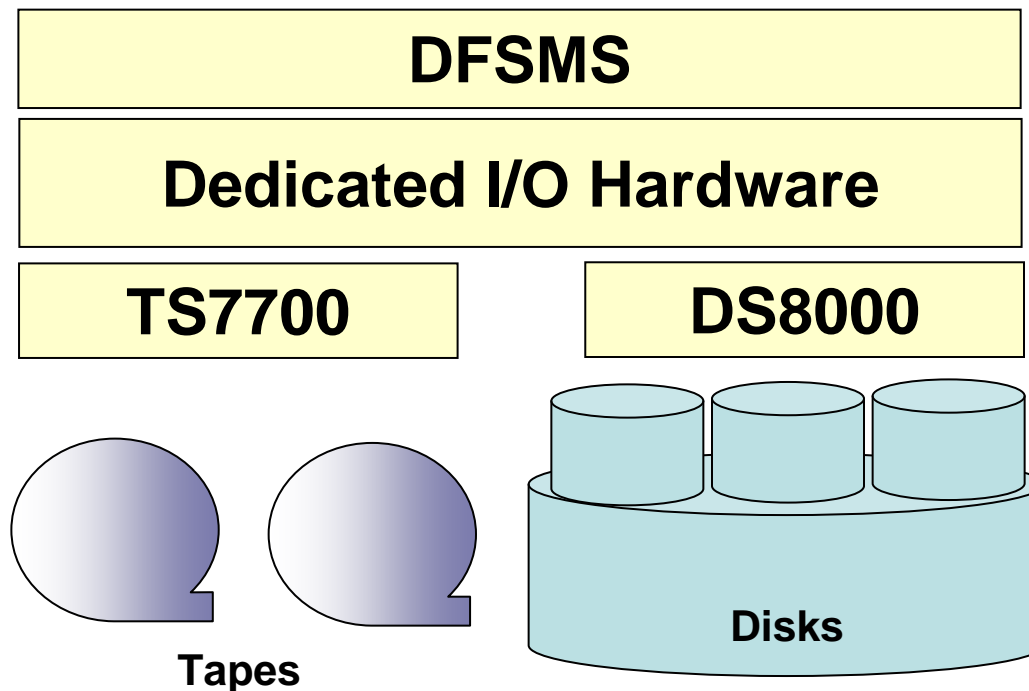


# Building A Scalable, Cost Effective Storage Environment Is The First Step



# System z Storage Management Is Designed To Handle Massive Amounts Of Data

- System z Data Facility Storage Management Subsystem (DFSMS)
- System z dedicated I/O hardware offloads I/O processing cycles
- IBM System Storage DS8000 and IBM Virtualization Engine TS7700 virtualize storage and deliver massive capacity
- System z integrates these capabilities to deliver optimized storage

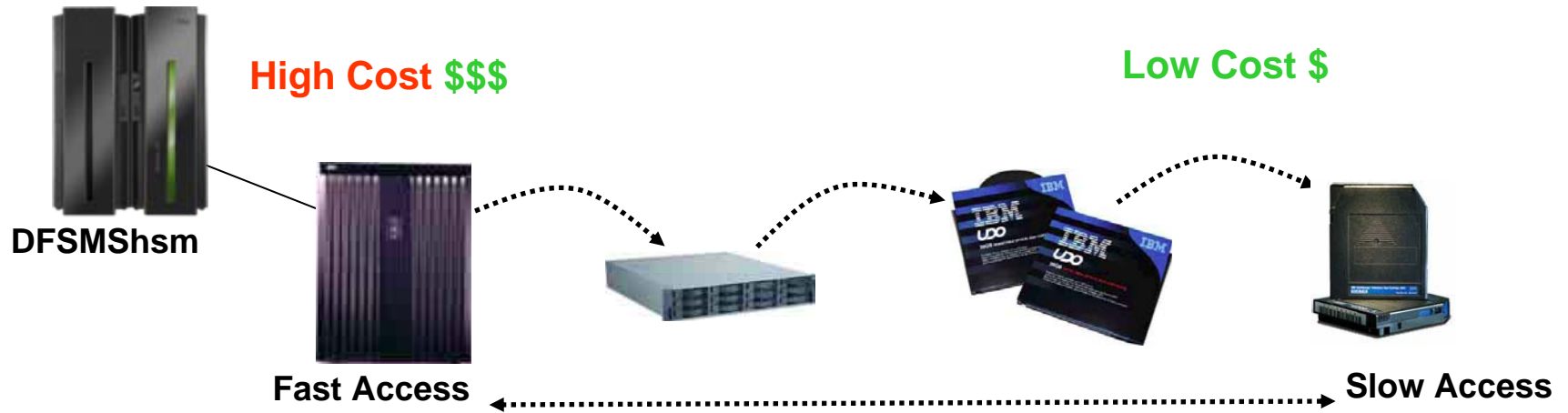


# System z DFSMS Storage Management

- Provides System z file system and access methods
  - ▶ E.g. BSAM, QSAM, VSAM, z/OS Unix file system ...
  - ▶ Extendable while running
- Storage management features
  - ▶ Automate management of datasets, catalogs, objects, z/OS UNIX files and logical volumes
  - ▶ Move, copy, backup, recovery and automatic space management
  - ▶ Manage removable media
  - ▶ Manage movement of data in storage hierarchy
  - ▶ Concurrent access of VSAM data



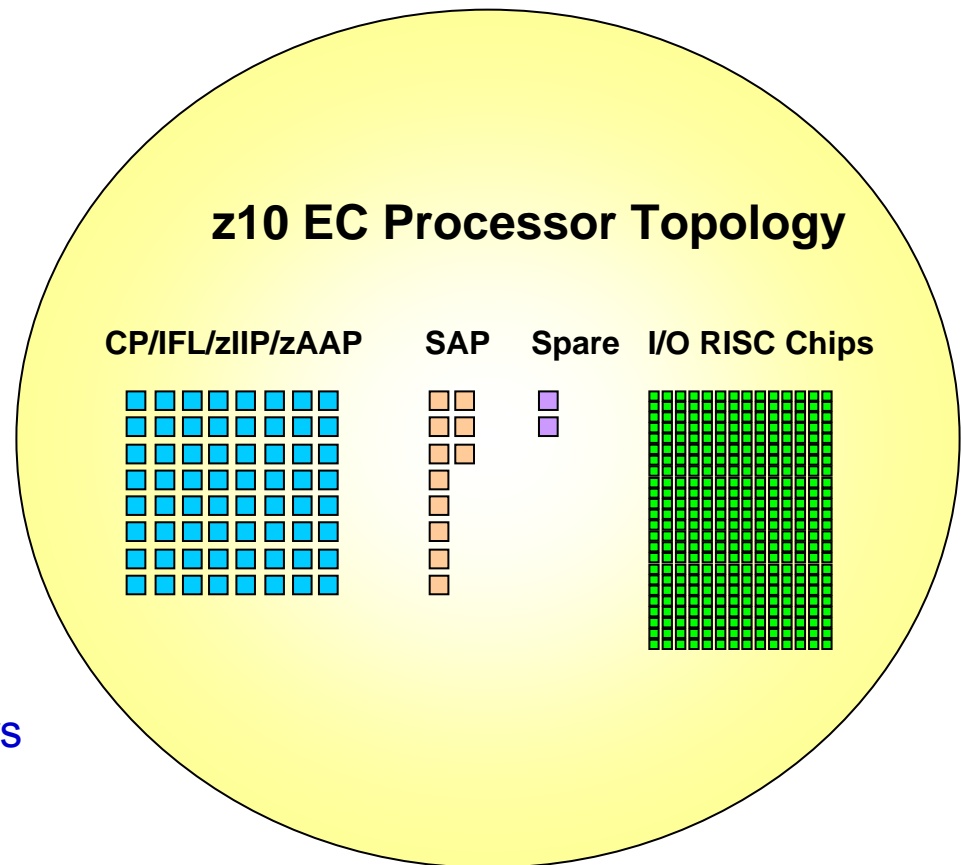
# Hierarchical Storage Management (HSM) Autonomically Migrates Data For Archival



- References to data typically diminish over time
- Hierarchical storage management automatically moves older data to slower devices
  - ▶ Reference to migrated data initiates immediate retrieval to faster devices
- DFSMSHsm provides automated hierarchical storage management for System z
  - ▶ Distributed servers require a separate product like Tivoli Storage Manager for Space Management

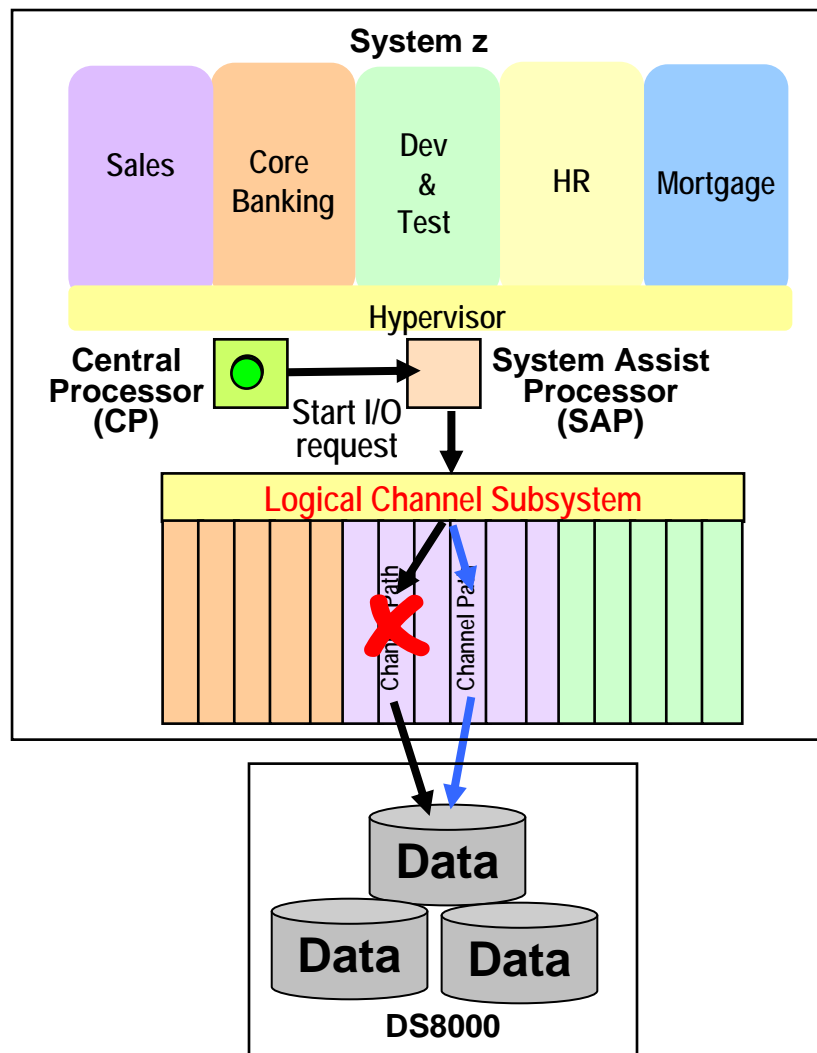
# System z Also Has Dedicated I/O Hardware To Enhance Performance

- Offload I/O operations to dedicated hardware
- Up to 11 System Assist Processors (SAP) coordinate I/O requests
- Up to 336 RISC processors handle I/O operations
- I/O Offload saves general purpose CPU cycles
- Maximum I/O Bandwidth of 288 GB/sec without impact to workload capacity
- HP Superdome uses general processors for I/O – no dedicated processors
  - ▶ Sustained I/O bandwidth less than half, while impacting workload



# Virtualization Of I/O Enables Redundant I/O Paths

- I/O Virtualization provided by Logical Channel Subsystem
  - ▶ Up to 1024 logical channel paths
- Virtualization enables optimal Physical I/O path to be used
  - ▶ Dynamic path selection
  - ▶ Load balances I/O traffic
- Transparent Failover
  - ▶ SAP recovers I/O operations in progress and switches to alternate path



# Solid State Disk Drives Are Here To Revolutionize Storage

- Semiconductor storage delivered in DS8000 storage subsystems
  - ▶ Random access solid state storage – no moving parts
  - ▶ Electronically erasable medium
- Response times is around 0.8 milliseconds in contrast to 6 milliseconds for a typical hard disk drive
  - ▶ 5-10x improvement in throughput and queries
  - ▶ SSD drives can sustain I/O rates two orders of magnitude higher than traditional spinning disk
  - ▶ Reduce the “batch window”
  - ▶ DFSMS automatically controls allocation of new datasets to SSD drives
- Cost reductions
  - ▶ 75% reduction in space
  - ▶ 80+% reduction in power and cooling
  - ▶ Reduce RAM requirements

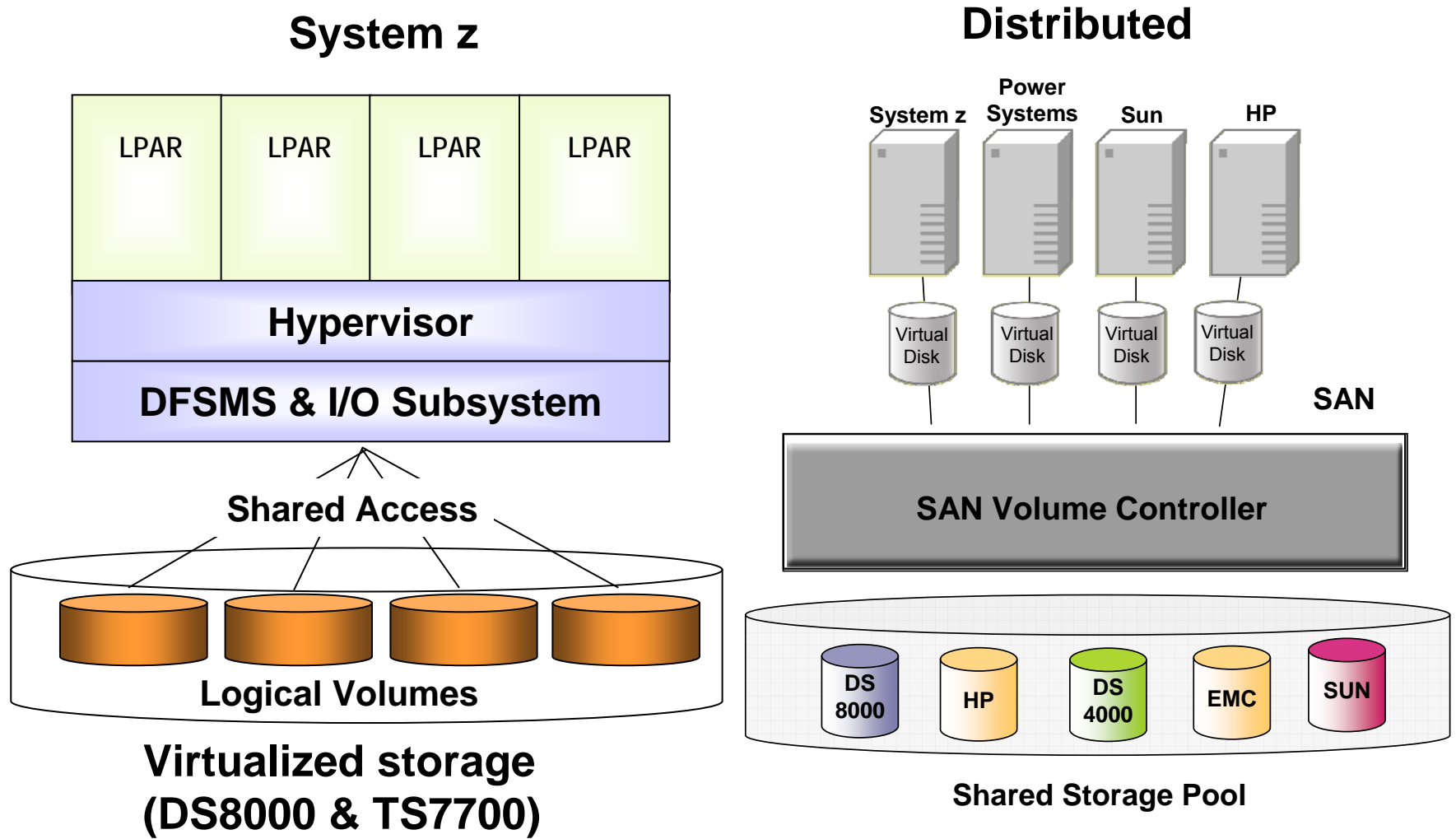


# IBM DS8000 And TS7700 Provide High Capacity Storage For System z

- DS8000 supports a mix of disk drive types up to 461 TB
  - ▶ Maximum of 1024 disk drives
  - ▶ Solid State Disk drives (146GB)
  - ▶ 450 GB Fiber Channel Hard Disk Drives (450 GB)
- Up to 4.9 million I/O Operations per second
- Stripe data across multiple RAID arrays
  - ▶ Minimize disk “hot spots”
- Data mirroring for business resilience
  - ▶ Synchronous copies up to 300 km apart
  - ▶ Asynchronous copies over virtually unlimited distances
- Supports System z Extended Address Volume
  - ▶ Up to 223 GB per volume
- Supports Dynamic Volume Expansion
  - ▶ Increase volume size while running
- TS7700 provides virtual tape solution
  - ▶ Up to 70TB disk cache and 11PB capacity with TS3500 Tape Library



# Storage Virtualization Is Built Into System z... Distributed Solutions Need Additional Products



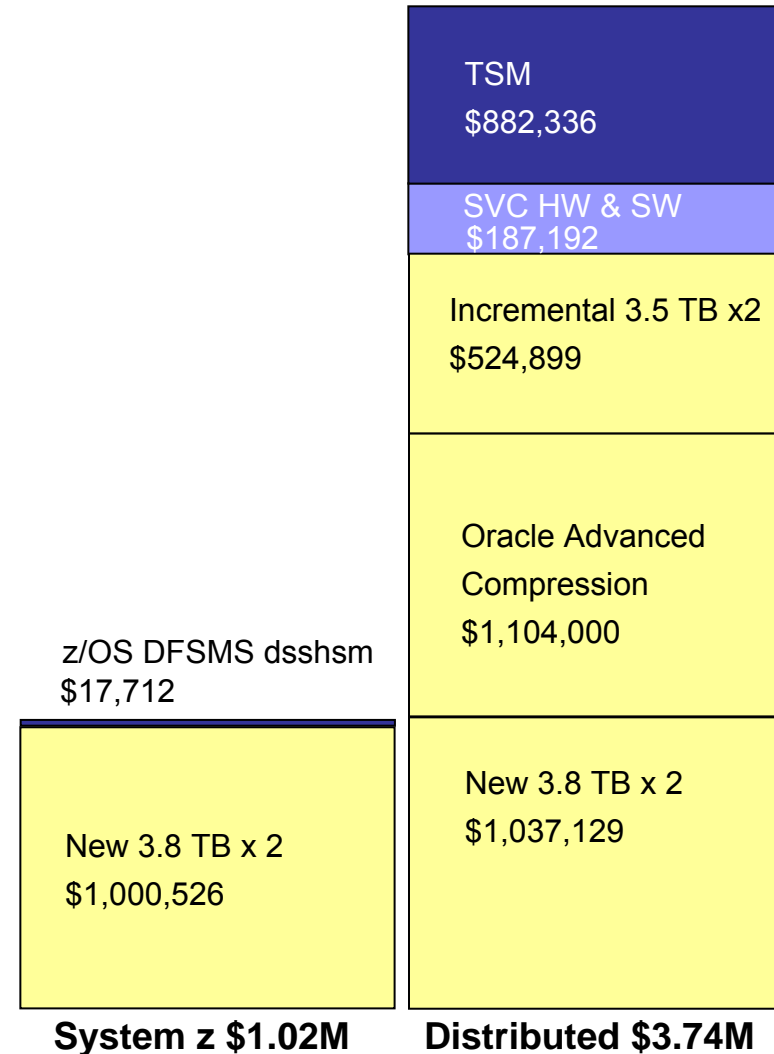
**PAV supports parallel access of logical volumes within the same system and MA supports I/O parallelism across different systems**

# DB2 Hardware Compression For System z Further Reduces Storage Costs

- Data Warehouses (TPC-H benchmark):
  - ▶ 62% (DB2) vs. 27% (Oracle)
- Save over **TWICE** as much on disk space over Oracle
- DB2's compression also saves on memory and I/O used
  - ▶ You'll need less buffer cache than with Oracle
  - ▶ You'll also do less I/O than with Oracle
  - ▶ You'll also need substantially less backup storage space
- Flexible DB2 compression algorithm applies to more database tables
  - ▶ Oracle algorithm limitations limits its effectiveness

# System z And DB2 Reduce The Cost Of Storage By 73% For A New 10 TB Database

- For new storage capacity, 3.8TB x 2 (Primary+Secondary),
  - ▶ DS8100 for System z and HPXP2400 for Distributed
- Data Compression (10TB Storage)
  - ▶ System z – No incremental storage required, since DB2 uses built-in hardware compression, which supports up to 62%
  - ▶ Distributed – Incremental 3.5TB x 2 capacity since Oracle Advanced compression supports up to 27%
- Storage Management (HSM) and Virtualization (Data Sharing)
  - ▶ System z – DFSMS
  - ▶ Distributed – San Volume Controller (SVC) for Virtualization and Tivoli Storage Management (TSM) for HSM

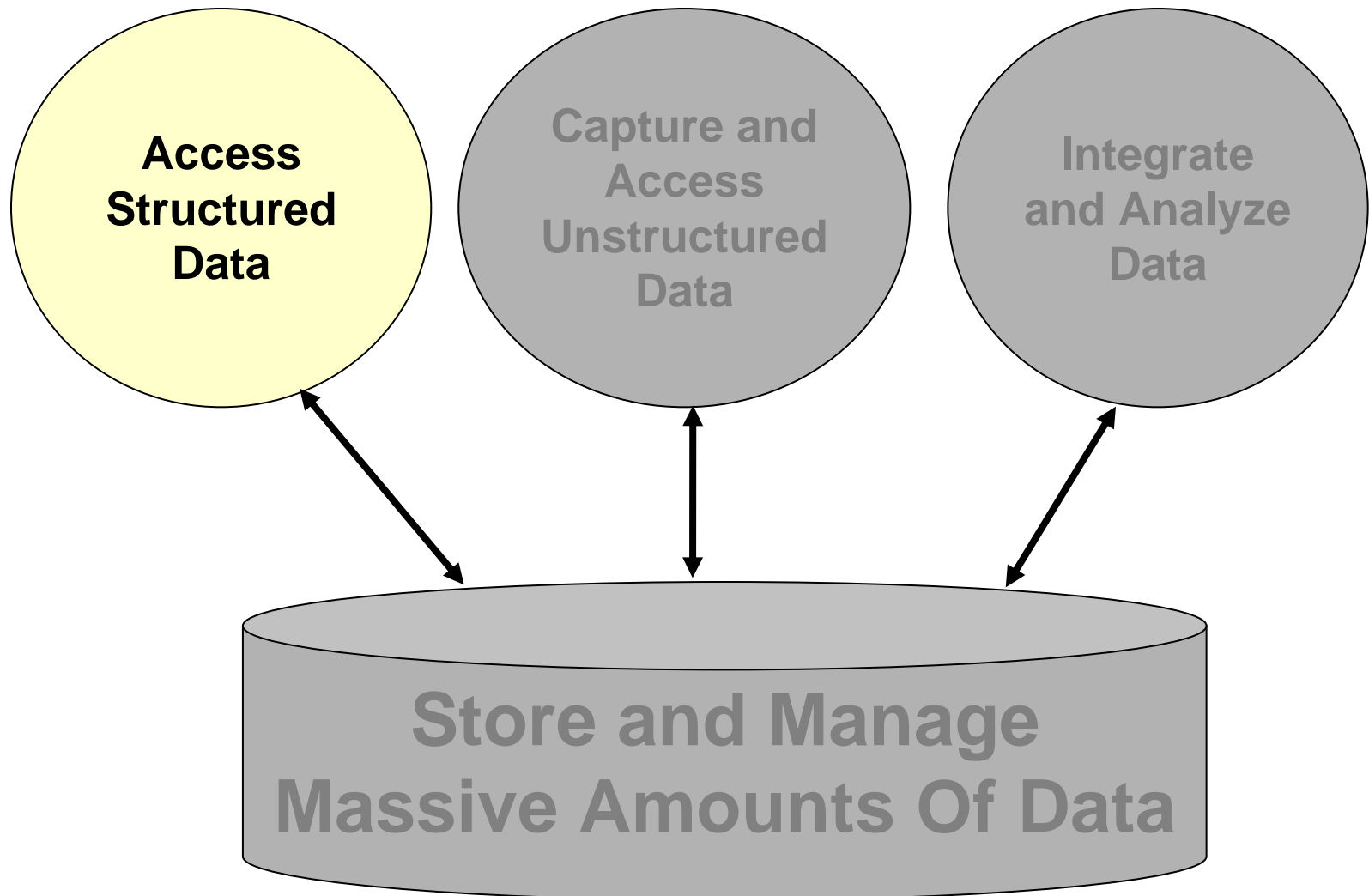




# Philippine Airlines Selects System z And IBM System Storage To Support Exponential Growth

- As PAL prepared to launch new routes to both domestic and international destinations, it realized it needed to upgrade its current information infrastructure
- PAL required better performance and superior throughput of the storage systems to run more efficiently. PAL also required an off-site fallback storage for business continuity and disaster recovery
- PAL replaced three different multi-vendor disk systems with an IBM storage solution consisting of the IBM System Storage Turbo DS8300

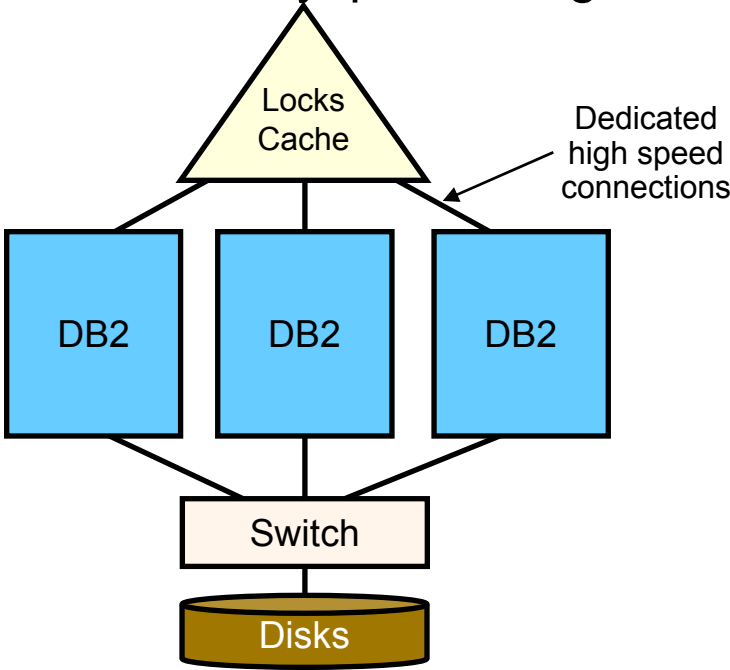
# DB2 For z/OS Is The Smarter Choice For Structured Data



# DB2 Optimized For z/OS Outperforms Oracle Designed For Commodity Hardware

## DB2 for z/OS

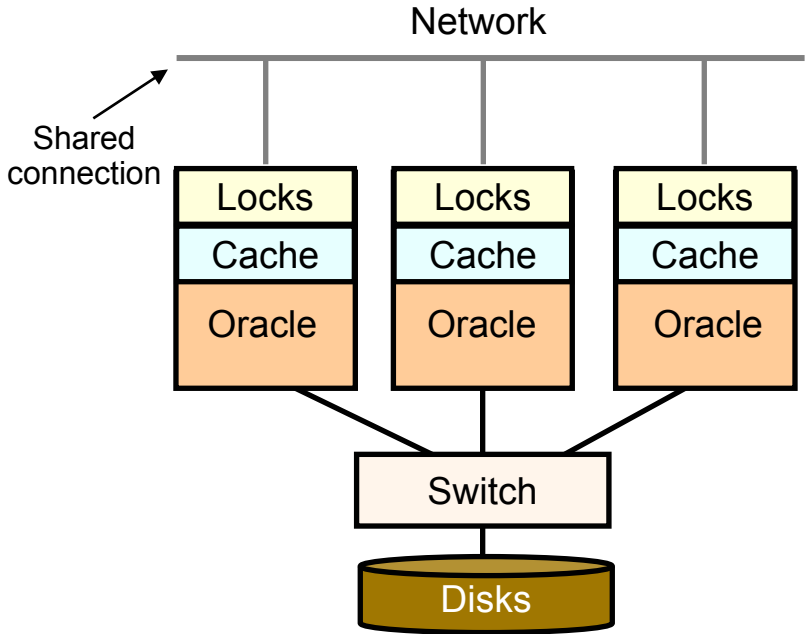
Centralized Sysplex Design



**High speed centralized**  
lock manager in  
coupling facility

## Oracle RAC

Distributed Lock and Data Design



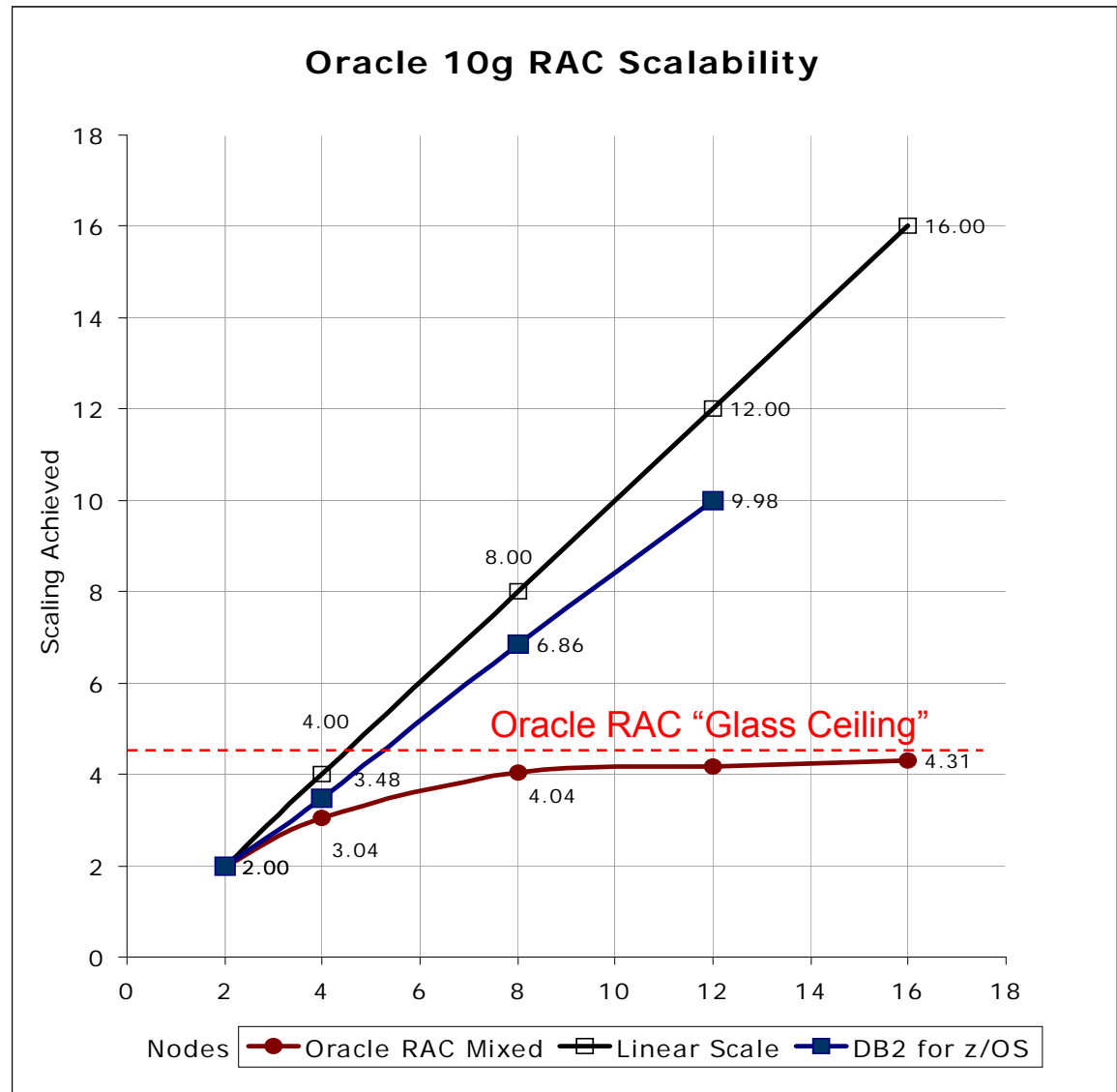
**Distributed lock**  
management with  
high messaging **overhead**

# HP Agrees! Oracle RAC Scale Out Is Limited

- DB2 for z/OS provides near-linear scalability with relatively little overhead as nodes are added
- With Oracle RAC, overhead increases rapidly as additional nodes are added and performance degrades after only 4 to 6 nodes

Sources: "Scale-up versus scale-out using Oracle 10g with HP StorageWorks", Hewlett-Packard, 2005

"Enterprise Data Base Clustering Solutions" ITG, October 2003



# DB2 pureXML Is Most Efficient

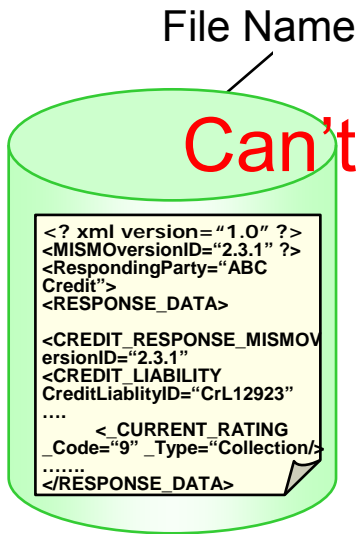
```

<MISMOVersionID="2.3.1" ?>
<RespondingParty="ABC Credit">
<RESPONSE_DATA>
  <CREDIT_RESPONSE_MISMOVersionID="2.3.1"
    CreditResponseID="CRResp0001"
    CreditRatingCodeType="Equifax">

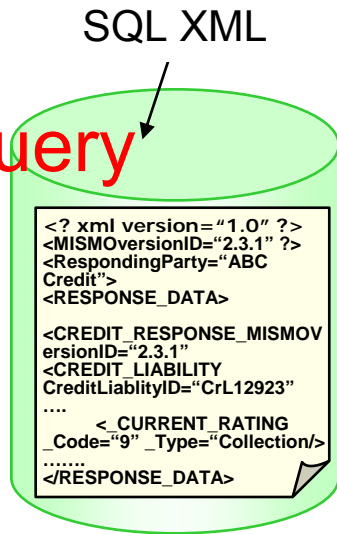
  <CREDIT_BUREAU_Name="ABC Credit" _StreetAddress="..
    ...
  </CREDIT_BUREAU>
  <BORROWER BorrowerID="B1" _FirstName="Joe" _LastName="Smith"
    ....
  </BORROWER>
  <CREDIT_LIABILITY CreditLiabilityID="CrL12923"
    ....
    <_CURRENT_RATING _Code="9" _Type="Collection"/>
  ....
</RESPONSE_DATA>

```

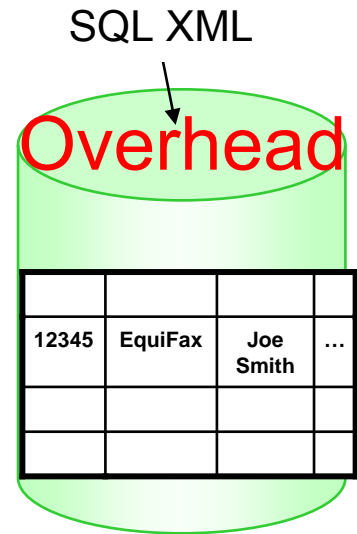
**BEST!**  
 Performance  
 Sparse Data  
 Schema  
 Evolution



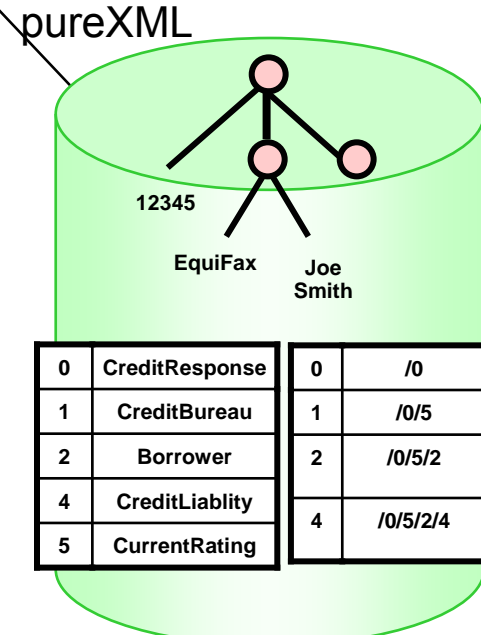
**File System**



**BLOB  
(Oracle)**



**Shredded  
(Oracle)**

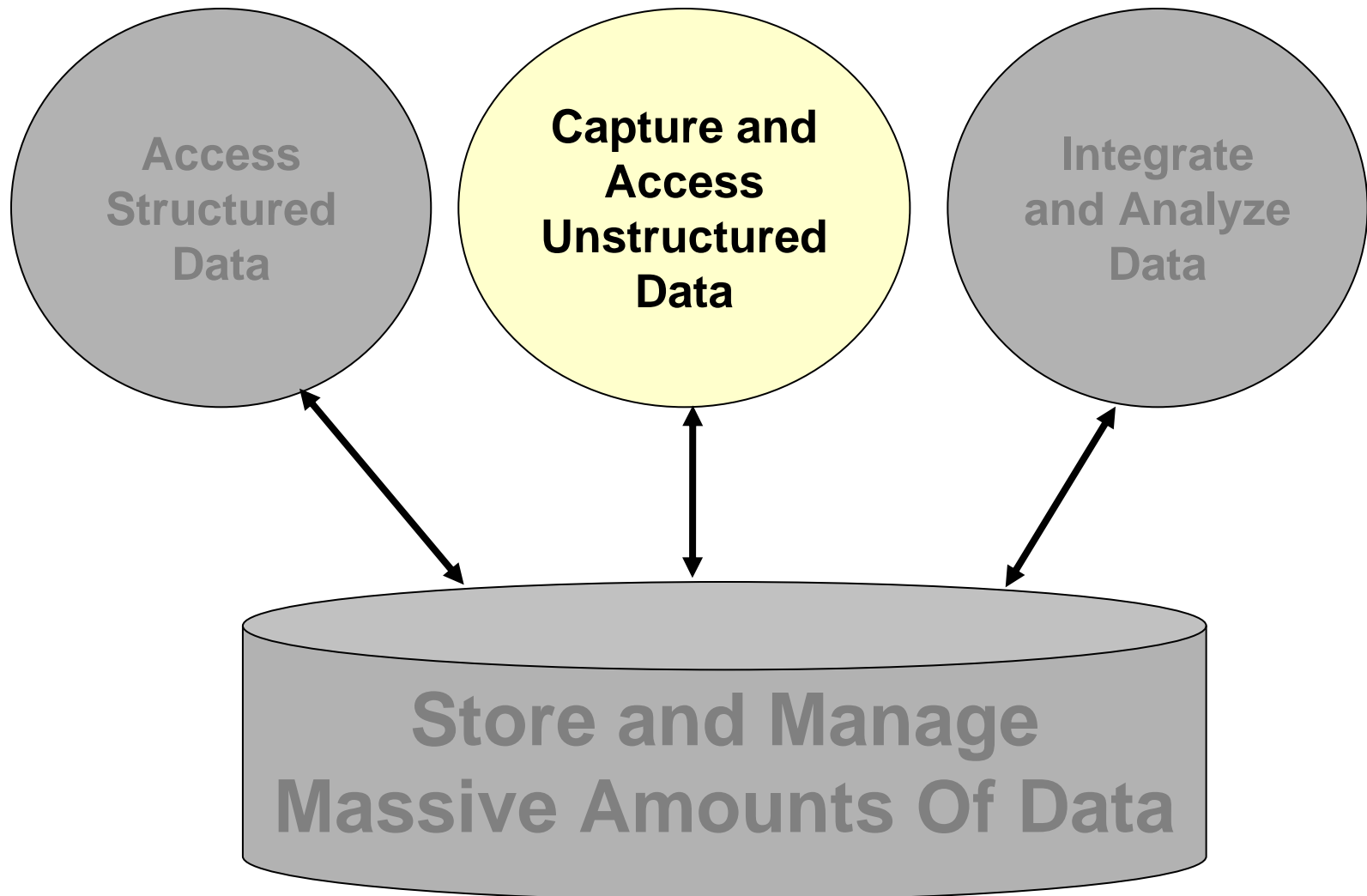


**Native Support  
(DB2)**

# System z Is A Perfect Platform For DB2

- Coupling Facility enables unmatched scalability through centralized cache and lock management
- Hipersockets enable fast, secure communication between DB2 z/OS and zLinux applications
- Integrated with RACF and Multi Level Security
- Supports System z hardware encryption – Crypto Express 2
- DB2 Recovery Expert for automatic recovery and backup
- Average offload 40% of workload onto zIIP processors to reduce licensing costs
- Hardware compression in addition to “Venom” deep compression can reduce storage up to 70%
- System z parallel sysplex supports rolling updates to running DB2

# Handling Unstructured Data Is A Key Step In A Smarter Information Management Strategy



# Capture Paper Documents And Manage Electronic Data With FileNet

Our mortgage business is drowning in paper and folders! It's costly and slows us down



**Mortgage Business  
VP**



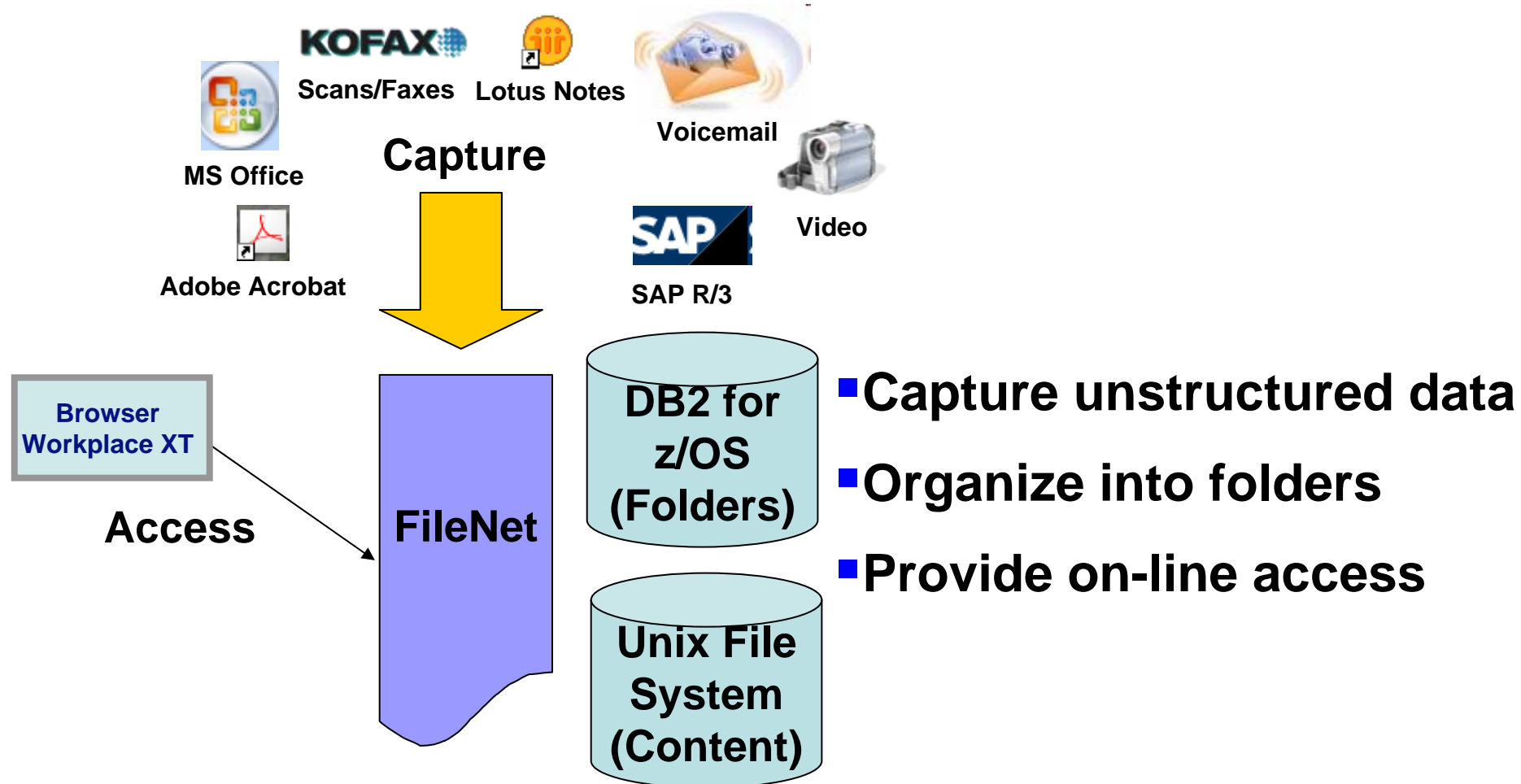
FileNet Content Manager on System z can help you efficiently store and use data in case management scenarios



**IBM**



# FileNet Content Manager Captures A Variety Of Content Data Online



# FileNet Content Manager Can Help Service Oriented Finance Go Paperless

## Case Management Paradigm

- “Folder” collects all the documents for each mortgage:
  - ▶ Credit Reports
  - ▶ Proof of Identity (Driver’s License)
  - ▶ Email
  - ▶ Change of Address eForm
  - ▶ Picture and Video of house
  - ▶ Appraisal, Inspection Report
  - ▶ Federal Tax Return
- Role-based security
- Library Services (Check-In/Check-Out)
  - ▶ Versioning and Tracking for compliance

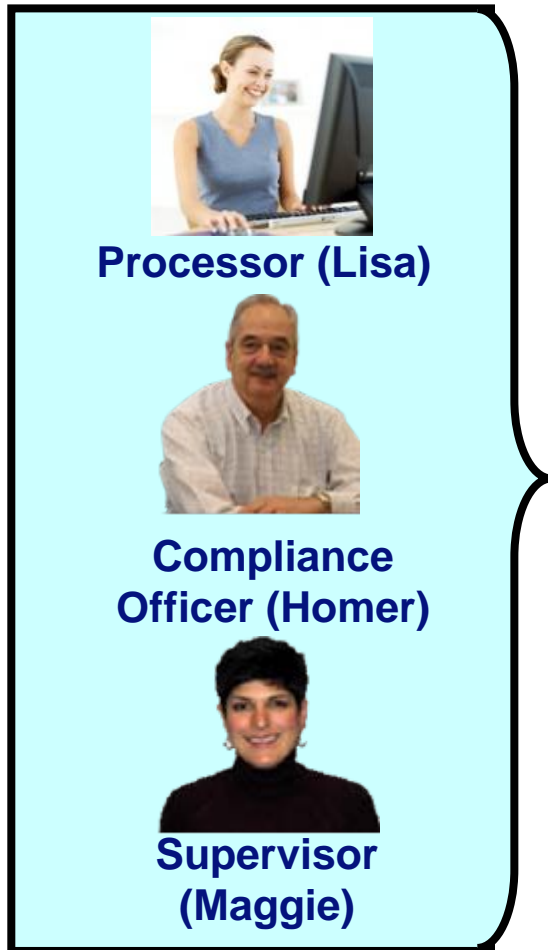
**Mortgage documents can be accessed on-line using a case management approach.**

**Let’s review some of the capabilities IBM’S FileNet P8 Platform provides**



**IBM**

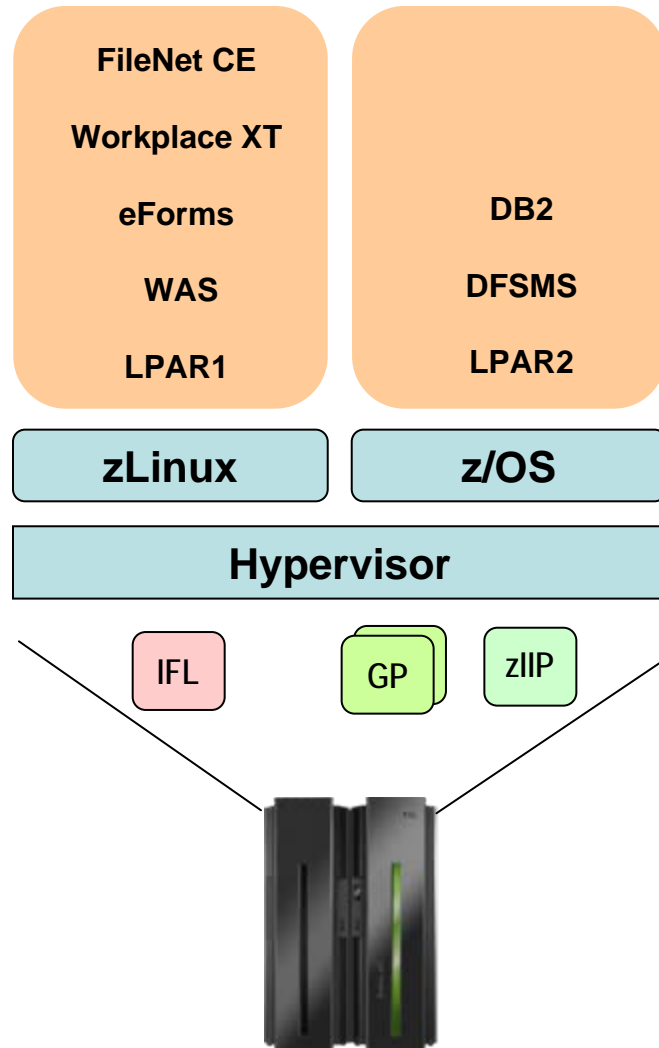
# FileNet Enterprise Content Management Solution For Mortgage Document Handling



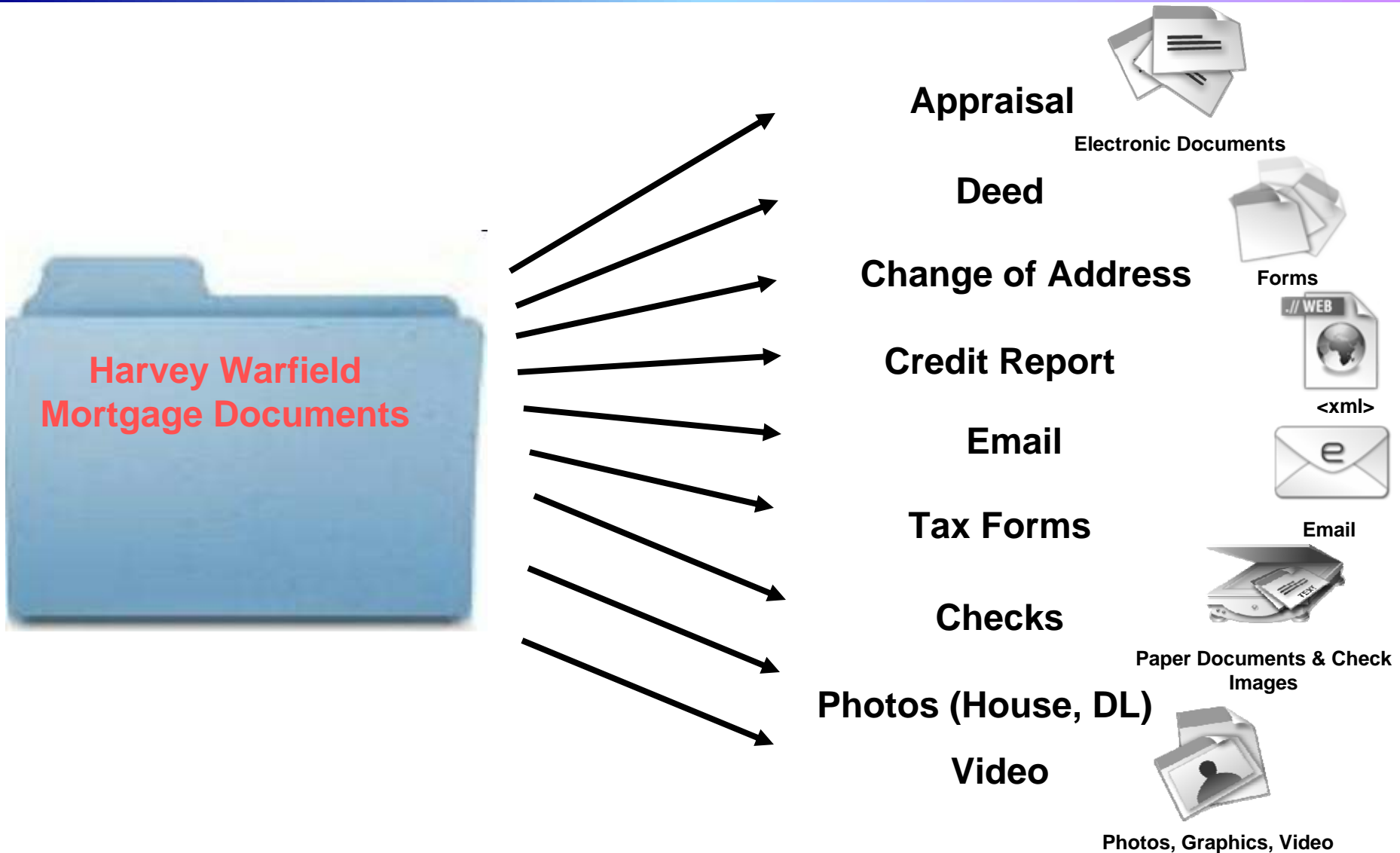
**Processor (Lisa)**

**Compliance Officer (Homer)**

**Supervisor (Maggie)**



# DEMO: IBM FileNet Workplace XT, eForms And IBM FileNet Content Engine



# Why Deploy FileNet On System z?

- Lower cost as an incremental workload
- Take advantage of System z storage management capabilities
  - ▶ Capability to store massive amounts of data
  - ▶ Virtualized storage is included
  - ▶ Hierarchical storage management is included
  - ▶ Dedicated I/O subsystem offloads I/O
- Linux for System z quality of service
  - ▶ Reliability and serviceability

# Case Study: Deploy FileNet Content Manager On System z With Disaster Recovery (1,000 Users)

*Existing Mainframe*



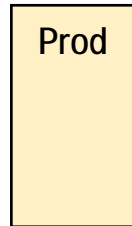
Existing z10:  
2 GP 1,720 MIPS  
DB2 and utilities  
With 20Tb storage

*Existing Disaster Recovery Site*



Existing:  
1 GP processor for hot  
disaster switch-over  
1 "dark" DR processor  
With 20Tb storage

*Add 1 LPAR for FileNet Content Manager w 3.8 TB incr. storage*

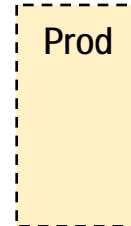


2,184 MIPS  
additional  
workload on z/OS  
and 920 MIPS on  
zLinux

Incremental:

2 GP 1,310 MIPS (60%) DB2, Utilities & DFSMS  
1 zIIP 874 MIPS (40%) DB2  
1 IFL 920 MIPS FileNet Content Manager & WAS  
Add 10 GB memory

*And add Disaster Recovery w 3.8 TB Storage*

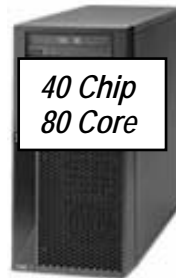


*3 year  
cost of  
acquisition  
\$5.8M*

Capacity Backup:  
2 GP  
1 zIIP  
1 IFL

*Or add HP Integrity Superdome sx2k 9140N Server w 3.8 TB incr. storage*

Prod



40 Chip  
80 Core

Documentum, Oracle,  
SVC, TSM

272,902\*  
Performance Units

*And add Disaster Recovery w 3.8 TB storage*

Prod



40 Chip  
80 Core

*3 year  
cost of  
acquisition  
\$12.6M*

HP DR solution is used in  
software and hardware

\*Performance Units required = (2,184+920) MIPS x 87 = 270,048

# New Intelligence Is The Next Step For A Smarter Information Strategy

