



IBM Tivoli Storage Infrastructure Management Solutions

## **Tivoli Integrated System z Storage Management**

*Louis Hanna – lhanna@us.ibm.com*

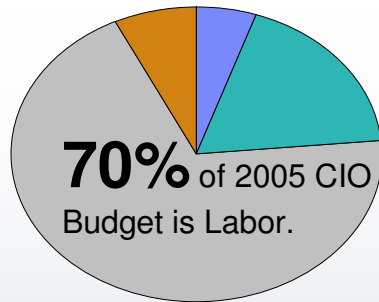
5/5/2009

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## Agenda

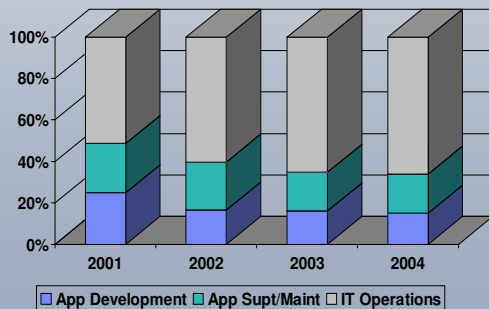
- **Storage challenges**
- **Traditional IBM System z Storage Infrastructure**
- **OMEGAMON XE for Storage on z/OS:**
  - TEP interface
  - Storage capabilities
  - Integration for full Tivoli power
- **Key Tivoli zStorage solutions**
- **IBM's System z Storage Management Future Directions**
- **The Storage Assessment**

# Storage Management Challenges



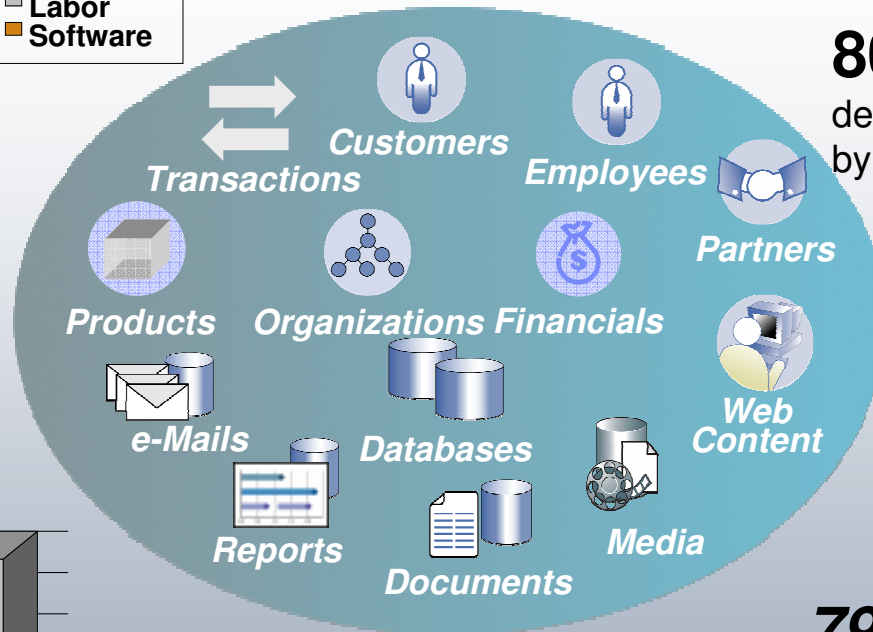
Source: Tivoli Commissioned IDC Study 1Q05

*Operations labor cost is largest and faster growing part of CIO budgets today*

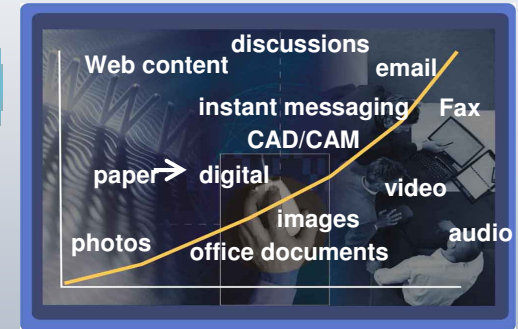


Source: Gartner Group, IT Spending & Staffing surveys

**37%** CGR Disk Storage Growth '96-'07



**80%** of IT problems are not detected by IT staff until reported by end users



**60%+** of CEOs: Need to do a better job capturing and understanding information rapidly in order to make swift business decisions

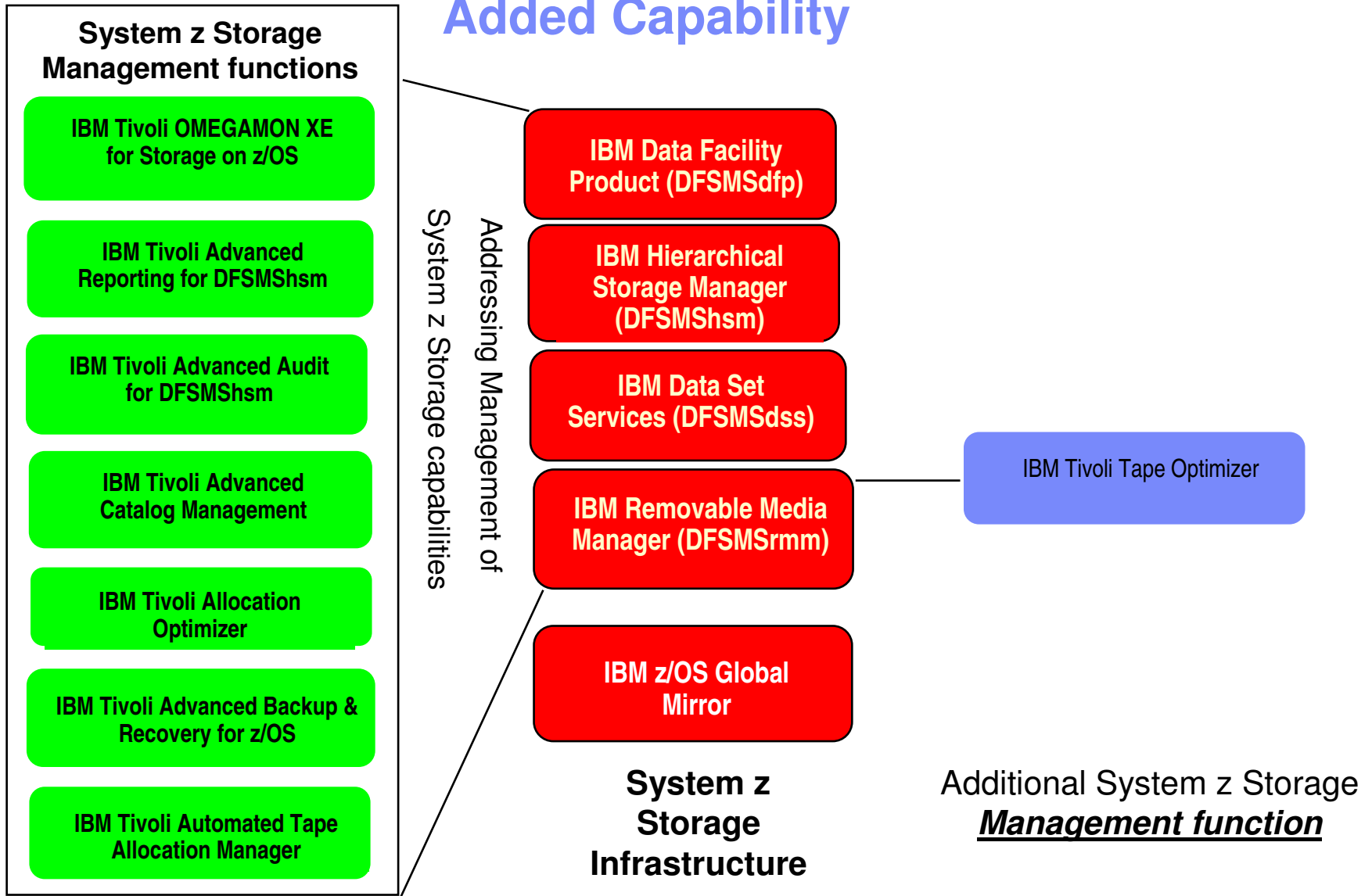
**79%** of companies: have 2 + repositories... (25%: have 15 +) used to store data from a large variety of information sources

Sources: IBM & Industry Studies, Customer Interviews

## Key elements of our storage strategy

- Integration
  - **The OMEGAMON family of products offer integration between different monitors; z/OS, DB2, IMS, CICS, MQ, zLinux, Storage ...**
  - **Zoom in on Storage and we still offer high levels of integration; XE For Storage, Tivoli Advanced Tools (ACM, AAH, ARH, ABR), DFSMS Suite, AO, ATAM ...**
- Integration offers a variety of benefits
  - **Reduced training costs**
  - **Common infrastructure**
  - **Single point of control**
- Ease of deployment – The TEP installs under Internet Explorer (just point your browser to it)
- Automated monitoring, response and notification

## System z Storage Management Solutions: Added Capability





IBM Tivoli Storage Infrastructure Management Solutions

# IBM Tivoli OMEGAMON XE for Storage

5/5/2009

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## OMEGAMON XE for Storage's User Interface (TEP)

- **Browser based access to data**
- **Capability of creating alerts using logic as opposed to just threshold setting**
- **Ability to see alerts and associated information about the problem from the same interface**
- **Reflex automation capabilities (take action)**
- **Provide information about a situation through the Expert Advise feature**
- **Integrate your OMEGAMON alerts with other systems information from OMEGAMON monitors using DE**
- **Dynamic Workspace Linking**
- **Built-in TN3270 interface**
- **Built-in Browser interface**
- **Real-time, near term and long term history**

# IBM Tivoli Enterprise Portal Interface

The screenshot displays the IBM Tivoli Enterprise Portal interface for monitoring WebSphere processes. The interface is annotated with several callouts:

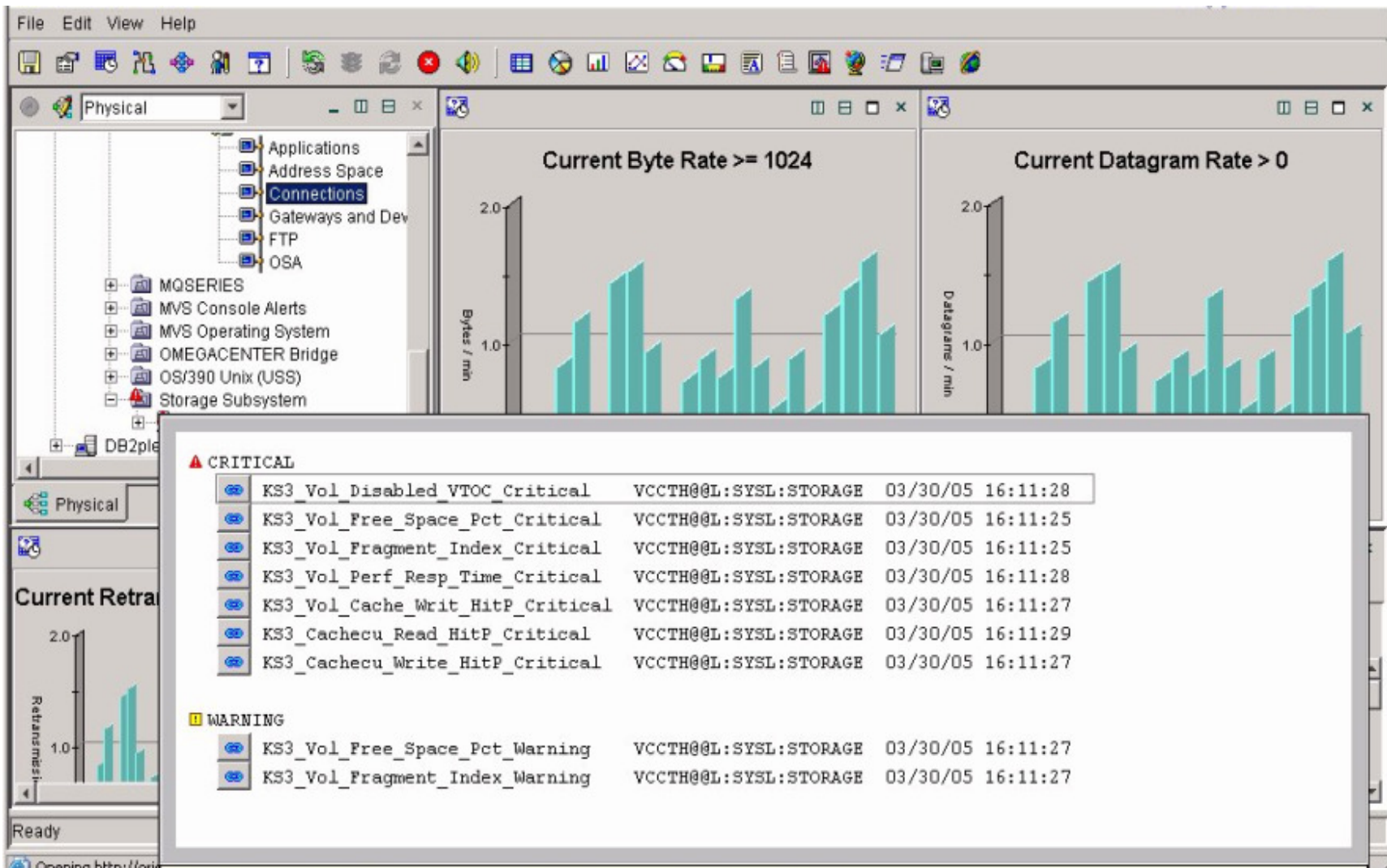
- Navigator:** A tree view on the left side of the interface showing the system hierarchy, including OS/390 Systems, SYSG, and OS/390 Unix (USS).
- Selectable Chart Options:** A toolbar at the top of the chart area containing various icons for different chart types and views.
- Personalized Views:** A callout pointing to the chart area, indicating that users can customize their views.
- View Zoom:** A callout pointing to a zoom control icon on the right side of the chart area.
- Splitter controls:** A callout pointing to a splitter control icon at the bottom right of the chart area.
- Intelligent Linking:** A callout pointing to a table of OS/390 UNIX Processes for WebSphere, where clicking on a process name in the table links to its detailed view.
- Persistent customized workspaces:** A callout pointing to the overall interface layout, indicating that users can save their customized workspace configurations.

The main content area features two charts: "UNIX Run Time" (a 3D bar chart) and "CPU Times" (a grouped bar chart comparing User CPU Time and System CPU Time). Below the charts is a table titled "OS/390 UNIX Processes for WebSphere" with the following data:

MVS Status	Process Status	Execution State	Process ID	Parent Process ID	Leader Session ID	Process Group	Foreground Pro
Normal	Multiple_Tasks_In_Process_+ Pthrea...	Running_not_in_kernel_wait	50462821	1	50462821	50462821	
Normal	Multiple_Tasks_In_Process_+ Pthrea...	Running_not_in_kernel_wait	33685615	1	33685615	33685615	
Normal	Multiple_Tasks_In_Process_+ Pthrea...	Running_not_in_kernel_wait	50462832	1	50462832	50462832	
Normal	Multiple_Tasks_In_Process_+ Pthrea...	Running_not_in_kernel_wait	33685672	1	33685672	33685672	
Swapped_Out	Multiple_Tasks_In_Process_+ Pthrea...	Running_not_in_kernel_wait	16908492	1	16908492	16908492	
Swapped_Out	Multiple_Tasks_In_Process_+ Pthrea...	Running_not_in_kernel_wait	33685727	1	33685727	33685727	
Normal	Multiple_Tasks_In_Process_+ Pthrea...	Running_not_in_kernel_wait	16908519	1	16908519	16908519	
Normal	Multiple_Tasks_In_Process_+ Pthrea...	Running_not_in_kernel_wait	50462998	1	50462998	50462998	



# OMEGAMON XE for Storage Alert



# Events, details, get Expert advice and Take Action

The screenshot displays the IBM Tivoli Storage Infrastructure Management Solutions interface. It features a tree view on the left showing storage components like 'OMEGACENTER Bridge' and 'OS/390 Unix (USS)'. The main area is divided into three sections:

- Initial Situation Values:** A table showing storage volumes and their status. Three volumes are listed as 'Disabled'.
- Current Situation Values:** A table showing the current state of the same volumes, also listed as 'Disabled'.
- Take Action:** A section with input fields for 'Name' and 'Command', and a 'Run' button.
- Expert Advice:** A text box providing guidance: 'A VTOC index has been disabled. This can degrade performance on the volume. Enable the VTOC index.' Below this is an 'Expert Advice' button.

The status bar at the bottom shows 'Ready', 'Hub Time: Wed, 03/30/2005 04:20 PM', 'Server Available.', and the event details: 'KS3\_Vol\_Disabled\_VTOC\_Critical - orion2000 - BLAWS'.

VTOC Index Status	Volume	Device Address	Device Type	Total Capacity Megabytes	Free Space Megabytes	Percent Free Space	Fragmentation Index	Largest Fr Extent Mi
Disabled	DUMP...	0223	0	2707	1767	65.2	157	16
Disabled	UN022B	022B	0	2707	2276	84.0	67	16
Disabled	SADMP2	0243	0	2707	1488	54.9	0	14

VTOC Index Status	Volume	Device Address	Device Type	Total Capacity Megabytes	Free Space Megabytes	Percent Free Space	Fragmentation Index	Largest Fr Extent Mi
Disabled	DUMP...	0223	0	2707	1767	65.2	157	16
Disabled	UN022B	022B	0	2707	2276	84.0	67	16
Disabled	SADMP2	0243	0	2707	1488	54.9	0	14

# High level environment views ...

SMS Storage Groups Space - IBM-6104E7C0288 - SYSADMIN \*ADMIN MODE\*

View: Physical

Storage Groups with Free Space % < 10

SMS Storage Groups Space Summary

Group Name	Storage Group Status	Storage Group Type	Non-Enabled Volumes	Total Volumes	VTOC Index Status	Low Volume Free Space %	High Volume Fragmentation Index	Largest Free Extent MB	Free Space MegaBytes	Free Space Percent	Total Space MegaBytes
PRIVATE NON-SMS VOLUMES	Not Connect...	n/a	No	528	Enabled	0.0	729	8114	470766	22.1	2127572
SGBLD	Enabled	Pool	No	5	Enabled	15.1	514	61	2095	15.4	13535
SGBOOK	Enabled	Pool	No	1	Enabled	51.7	127	3375	4204	51.7	8120
SGCIMS	Enabled	Pool	No	4	Enabled	11.0	457	2515	3506	32.3	10828
SGCIMST	Enabled	Pool	No	17	Enabled	11.2	470	2147	11572	20.3	56845
SGCLIENT	Enabled	Pool	No	15	Enabled	24.1	232	3556	48137	39.5	121800
SGCONSUL	Enabled	Pool	No	2	Enabled	49.1	75	1446	2785	51.4	5414
SGDB2	Enabled	Pool	Yes	8	Enabled	68.4	144	2386	16781	77.4	21656
SGDB2DOR	No		No	8	Enabled	63.8	328	6922	43683	80.6	54134
SGDB22	No		No	20	Enabled	0.3	884	4125	23597	36.3	64966
SGDCHSS	No		No	12.3	Enabled	12.3	471	208	2393	12.6	18947
SGDUMP	No		No	10.6	Enabled	10.6	117	946	9264	22.8	40605
SGKBASE	No		No	15.0	Enabled	15.0	345	481	12069	29.7	40605
SGLIST	No		No	10.0	Enabled	10.0	210	550	4960	13.0	37898
SGMQM	No		No	21.2	Enabled	21.2	588	458	5759	26.5	21656
SGOHC	No		No	11.6	Enabled	11.6	411	919	8451	17.3	48721
SGOMVS	No		No	345	Enabled	0.0	345	263	4190	5.3	78503
SGPKG	No		No	0	Enabled	5.1	0	417	417	5.1	8120
SGPKG2	No		No	59.4	Enabled	59.4	67	1396	1610	59.4	2707
SGPRIM	No		No	227	Enabled	0.2	904	227	23339	7.6	303180
SGSCLM	No		No	27.9	Enabled	27.9	395	1135	11539	38.7	29777
SGSMF	No		No	57.9	Enabled	57.9	165	2027	20893	77.1	27070
SGSOFT1	No		No	4	Enabled	69.5	17	2552	9090	83.9	10828
SGSRVCS	No		No	10	Enabled	30.5	332	1701	28715	35.3	81200
SGSUPPT	No		No	15	Enabled	30.8	192	1508	17824	43.8	40605
SATDIT	Enabled	Pool	No	12	Enabled	15.0	483	988	14766	15.1	97440

# Down to Dataset level information

Dataset Performance Detail - tehrle:16097 - SYSADMIN

File Edit View Help

Physical

ENTERPRISE  
 OS/390 Systems  
 SP22  
 Storage Subsystem  
 SYSG  
 Storage Subsystem  
 Application Summary Report  
 Channel Path Report  
 Cache CU Performance Report  
 Cache CU Status Report  
 Logical Control Unit Report  
 Tape Group Report  
 Virtual Tape Subsystems Report  
 SMS Storage Groups Performance

Physical

### Component Percent of Dataset MSR for All Jobs

DSN: SYS1.VTOC.VPRI123 Volume: PRI123

### Dataset Performance Detail Report

Jobname	ASID	IOSQ Time	Pend Time	Disconnect Time	Connect Time	Device Active Only Time	Response Time	I/O Per Second	Eligible Cache Percent	Cache Hit Percent	Cache Read Hit Percent	Cache Write Hit Percent	Read V Percent
HTAIR3	373	0.0	0.2	0.0	1.2	0.0	1.4	0.0	100.0	100.0	100.0	100.0	1
S2CN5G@	222	36.1	0.2	0.0	129.1	0.0	165.4	0.0	100.0	100.0	100.0	n/a	1
S2D85G@	224	0.0	0.3	0.0	0.8	0.0	1.0	0.0	100.0	100.0	100.0	n/a	1
S3CMS12	261	0.0	0.1	0.0	0.8	0.0	0.9	0.0	100.0	100.0	100.0	n/a	1
S3SUB12	260	61.0	0.2	0.0	138.6	0.0	199.8	0.0	100.0	100.0	100.0	n/a	1
S9GBOG1	720	0.0	0.2	0.0	0.8	0.0	1.0	0.0	100.0	100.0	100.0	n/a	1

DSN: SYS1.VTOC.VPRI123 Volume: PRI123

Ready Server Available. Dataset Performance Detail - tehrle:16097 - SYSADMIN

# Dynamic Workspace Linking in zStorage Management

The screenshot displays several interconnected windows in the Tivoli Storage Infrastructure Management Solutions interface:

- Basic Catalog Structure Summary:** A table listing catalog entries with columns for Name, Volume Serial, SMS Managed, Catalog On Shared DASD, Open, Shared Catalog, and Last Catalog Backup.
- Catalog Dataset Attributes:** A table listing dataset attributes with columns for Name, Volume Serial, Creation Date, and Last Ref Date.
- Catalog Volume Summary:** A table listing volume details with columns for Node, Volume Serial, Allocated Capacity, Fragmentation Index, Free Extent Count, Largest Free Extent, and Timestamp.
- Volume Capacity:** A bar chart showing allocated and free space for a volume.
- Volume File Rate:** A line graph showing file activity over time.
- Device Space Details:** A table listing device space information with columns for System ID, MVS Status, SMS Status, Device Address, Device Type, RAID Model, and LCU Number.
- Volume Space Details Report:** A summary table for a specific volume (BLD001) showing capacity, free space, fragmentation, and other metrics.
- Volume Space Details Report (Detailed):** A table showing detailed volume space metrics such as Allocated Space, Total Free Cylinders, Total Free Tracks, Free DSCBs, Free VTDC Index Records, VTDC Index Status, SMS Conversion Status, and Storage Group Name.

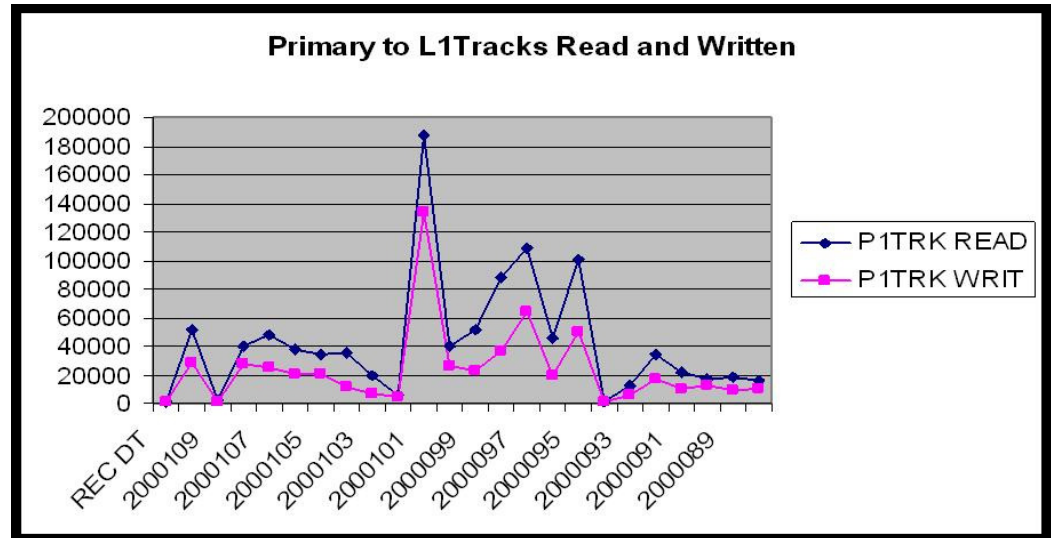
Callouts and arrows highlight the following features:

- Basic Catalog Structure Workspace:** Points to the Basic Catalog Structure Summary window.
- Link to Other Catalog Workspaces:** Points to the Catalog Dataset Attributes window.
- Link to OMEGAMON XE for Storage Workspace:** Points to the Device Space Details window.

# IBM Tivoli Advanced Reporting for DFSMSHsm

## ■ Provides Detailed HSM Reporting Capability

- Daily Health Reports
  - Provides reports for:
    - DFSMS Mounted Volumes
    - DFSMSHsm Managed Volumes
    - DFSMSHsm Space Management
    - DFSMSHsm Automatic Backup
    - DFSMSHsm Autodump Activities
  - Automatic Spreadsheet Charting
- Ad-hoc reporting
  - Fast and highly interactive
  - Easily find areas of concern
    - Drive the view to the area of concern
    - Look around, Act on what you see
- Perform “what-if” analysis
  - Migration thresholds
  - Recycle percent valid
- “Plans” Feature makes new reports simple to create and save
  - Provides filtering logic so you can drill down
- Automated command generation
  - Allows wrapping action commands around listed data sets
  - Go from “Now I know what to do” to “I’ve already done it”
  - Add your own customized commands to the command library



## ■ Easy-to-Use ISPF User Interface

## IBM Tivoli TEP Master View

The screenshot displays the IBM Tivoli TEP Master View interface. The main window is titled "Enterprise Status - tep-qa1 - SYSADMIN". It features a navigation tree on the left under the "Physical" view, showing a hierarchy of DFSMSShm Audit, Reporting, and Storage Subsystem components. The central area is dominated by the "Situation Event Console" window, which lists 8 events with columns for Severity, Status, Owner, Situation Name, Display Item, and Priority. Below this, the "Open Situation Counts - Last 24 Hours" window shows a bar chart with categories like NT\_Physical\_Disk\_Busy\_Warning and KS3\_Vol\_Cache\_Read\_HitP\_Critical. To the right, the "My Acknowledged Events" window provides a detailed table of events, and the "Message Log" window shows a list of messages with columns for Status, Name, Display Item, Origin Node, Global Timestamp, and a numeric value.

Severity	Status	Owner	Situation Name	Display Item	Priority
Warning	Open		NT_Log_Space_Low	System	Prir
Warning	Open		NT_Log_Space_Low	Application	Prir
Warning	Open		NT_Service_Error		Prir
Warning	Open		NT_Service_Error		Prir
Warning	Open		KS3_Vol_Fragment_Index_Warning		CAN
Warning	Open		KS3_Vol_Free_Space_Pct_Warning		CAN
Critical	Open		KRH_No_Space_In_Mig_Vol	37	CAN
Critical	Open		KS3_Vol_Free_Space_Pct_Critical		CAN

Severity	Status	Owner	Situation Name	Display Item	Source	Impact	Opened	Local Timestamp	Type
Warning	Open		NT_Log_Space_Low						
Warning	Open		NT_Log_Space_Low						
Warning	Open		NT_Service_Error						
Warning	Open		NT_Service_Error						
Warning	Open		KS3_Vol_Fragment_Index_Warning						
Warning	Open		KS3_Vol_Free_Space_Pct_Warning						
Critical	Open		KRH_No_Space_In_Mig_Vol	37					
Critical	Open		KS3_Vol_Free_Space_Pct_Critical						

Status	Name	Display Item	Origin Node	Global Timestamp	L
Open	KRH_No_Space_In_Mig_Vol	37	CANSRH:QA:AR	01/07/08 10:23:56	0
Open	KS3_Vol_Free_Space_Pct_Warning		CANSDSSM:QA:STORAGE	01/07/08 10:02:37	0
Open	KS3_Vol_Fragment_Index_Warning		CANSDSSM:QA:STORAGE	01/07/08 10:02:35	0
Open	KS3_Vol_Free_Space_Pct_Critical		CANSDSSM:QA:STORAGE	01/07/08 10:02:34	0
Open	MS_Offline		Primary:TEP-QA1-VM:NT	12/12/07 12:02:28	1
Open	NT_Service_Error		Primary:TEP-QA1-VM:NT	12/12/07 10:04:30	1
Open	NT_Service_Error		Primary:TEP-QA1-VM:NT	12/11/07 16:19:32	1

### Automatic Charts

## IBM Tivoli Advanced Audit for DFSMSHsm

- Audits, repairs, and ensures integrity of the DFSMSHsm environment, including tape.
- Automates data collection and corrective actions
- Proactive notification and alerts to critical problems which can be expertly resolved before a system outage occurs
- Finds and can correct 100% of DFSMSHsm errors
- Prove integrity of DFSMSHsm environment
- Operates many times faster than native DFSMSHsm commands, without performance impact on DFSMSHsm
- Ease-of-Use and performance permits regular rather than periodic audits

### Error Summary Panel

#### AUDIT MCDS SUMMARY

<VRRR.xx>

Row 1 to 17 of 31

OPTION ===>

SCROLL===> CSR

ENTER F TO DISPLAY FIXES OR B TO BROWSE ERRORS

S NUMBER COUNT MESSAGE

11D1C	0081708	MCD ENTRY IS NOT CATALOGED
11D2C	0000570	MCD ENTRY IS CATALOGED ON DIFFERENT VOLUME
11V2C	0000010	MCO VSAM COMPONENT ON DIFFERENT VOLUME
1103W	0000790	MCD ENTRY IS MISSING THE MCA ENTRY
11V1C	0002320	MCO VSAM COMPONENT IS NOT CATALOGED
1104C	0000070	MCD LEVEL 1 ENTRY HAS NO VTOC ENTRY ON L1 VOLUME
1105W	0000001	MCD VSAM BASE NAME IS MISSING IN MCO
1106C	0009109	MCD IS ON VOLUME WHICH HAS NO MCV ENTRY
1106V	0000017	SUMMARY OF VOLUMES HAVING NO MCV ENTRY



# Advanced Audit DFSMSHsm – MCDS Summary

Welcome SYSADMIN | Tivoli Enterprise Portal | Log out

File Edit View Help

View: Physical

Enterprise Portal Tree:

- Enterprise
  - z/OS Systems
    - SP13
      - Allocation Optimizer
      - Catalog Management
      - DFSMSHsm Audit
        - S3ACC14:SP13:AA
          - Agent Status Summary
          - Backup Control Dataset Error Summary
          - Migration Control Dataset Error Summary
          - Offline Control Dataset Error Summary
          - HSM Tape Error Summary
        - Storage Subsystem
        - SYS

MCDS Audit Summary Report

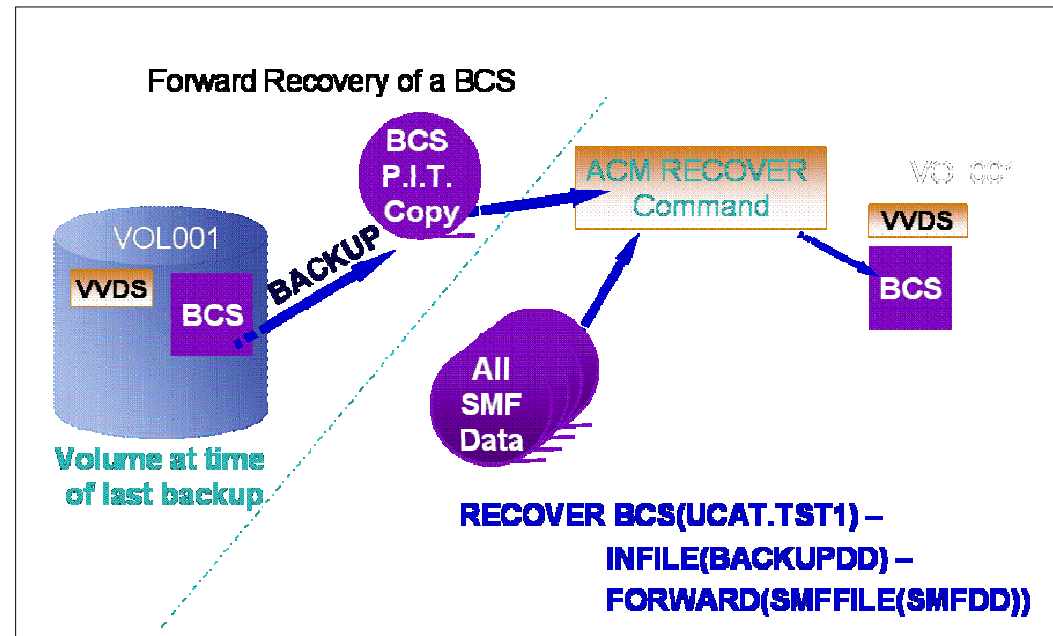
Error ID	Error Count	Record Count	Error Message	Timestamp
11D1C	21	21	MCD ENTRY IS NOT CATALOGED	10/15/07 16:16:21
11V1C	27	27	MCO VSAM COMPONENT IS NOT CATALOGED	10/15/07 16:16:21
11D2C	9	9	MCD ENTRY IS CATALOGED ON DIFFERENT VOLUME	10/15/07 16:16:21
11V2C	0	0	MCO VSAM COMPONENT ON DIFFERENT VOLUME	10/15/07 16:16:21
1103W	0	0	MCD ENTRY IS MISSING THE MCA ENTRY	10/15/07 16:16:21
1104C	9	9	MCD LEVEL 1 ENTRY HAS NO VTOC ENTRY ON L1 VOLUME	10/15/07 16:16:21
1105W	1	1	MCD VSAM BASE NAME IS MISSING IN MCO	10/15/07 16:16:21
1106C	0	0	MCD IS ON VOLUME WHICH HAS NO MCV ENTRY	10/15/07 16:16:21
1106V	0	0	SUMMARY OF VOLUMES HAVING NO MCV ENTRY	10/15/07 16:16:21
1107W	439	439	MCD LEVEL 2 IS ON VOLUME WHICH HAS NO TTOC ENTRY	10/15/07 16:16:21
1107V	4	4	SUMMARY OF VOLUMES MISSING IN TTOC	10/15/07 16:16:21
1108W	1	1	MCA ENTRY IS MISSING MCO VSAM COMPONENT ENTRY	10/15/07 16:16:21
1109W	0	0	MCD ALIAS IS NOT ON TTOC	10/15/07 16:16:21
1109V	0	0	SUMMARY OF VOLUMES WHERE ALIAS IS NOT IN TTOC	10/15/07 16:16:21
1110W	0	0	MCD HAS DUPLICATE MCA ENTRY	10/15/07 16:16:21
1111W	231	231	MCA ENTRY IS MISSING MCD ENTRY	10/15/07 16:16:21
1112W	0	0	MCO VSAM BASE NAME IS MISSING IN MCD	10/15/07 16:16:21
1113W	0	0	MCO VSAM COMPONENT NAME IS MISSING IN MCA	10/15/07 16:16:21
1114W	5	5	ALIAS NAME EXISTS ON VTOC, MCA IS MISSING	10/15/07 16:16:21
1115W	0	0	VTOC ALIAS NAME HAS VTOC ERROR	10/15/07 16:16:21
1116C	2	2	CATALOG ENTRY HAS NO MCD/MCO ENTRY	10/15/07 16:16:21
1117C	7	7	CATALOG ENTRY IS NOT CONNECTED TO MASTER CAT	10/15/07 16:16:21
1118C	1	1	MIGRATED DATA SET IS MISSING IN SDSP CLUSTER	10/15/07 16:16:21
1119W	43	43	ENTRY IN SDSP DATA SET IS MISSING IN MCDS	10/15/07 16:16:21
1120I	0	0	TTOC VOLUME IS EMPTY	10/15/07 16:16:21

MCDS Error Summary

Hub Time: Mon, 10/15/2007 04:16 PM | Server Available | Migration Control Dataset Error Summary - 9.52.104.198 - SYSADMIN \*ADMIN MODE\*

## IBM Tivoli Advanced Catalog Management for z/OS

- Provides powerful, safe, reliable, and easy ICF catalog and VSAM backup and *fast* forward recovery
- Protects a catalog's complex structural integrity, alerts for potential errors, and reduces recovery time
- Reduces application downtime by permitting catalog maintenance while open
- Allows “what-if” simulation to preview effects of actions
- Easy-to-use interface improves staff productivity



# Advanced Catalog Management – Catalog Summary

Catalog Summary - tep-srv - RPENNY
File Edit View Help

View: Physical

- Servers
  - Alias Growth
  - Catalog Dataset Attributes**
  - Catalog Summary
  - Catalog Volume Summary
  - Cache Performance
  - Last Catalog Backup
- Storage Subsystem
  - CANSDSST:RS22:STORAGE
    - Application Summary
    - Channel Path
    - Cache CU Performance
    - Cache CU Status
    - Logical Control Unit
    - Tape Group
    - Virtual Tape Subsystems

Largest Catalogs
x

### Largest Catalogs

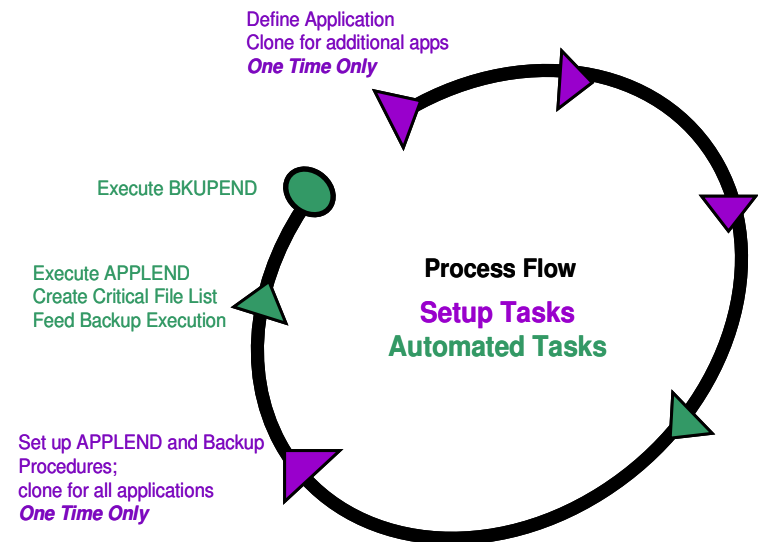
Report
x

Catalog Name	Volume Serial	High Used RBA	High Allocated RBA	▼ % 4GB Limit	CI/CA	CI Size	% Used CAs	Used CAs	Allocated to CAs	SMS Managed	Cache Type	Shared	ECS
ICF.RSPLEX01.DB2.CAT1	DBP13C	208650240	210124800	4	180	4096	99	283	Yes	Yes	ICF	Yes	Yes
CATALOG.RSPLEX01.USERCAT	S1P101	112803840	114278400	2	180	4096	98	153	Yes	Yes	ICF	Yes	No
ICF.RSPLEX01.DEV.CAT1	DVP101	45711360	47923200	1	180	4096	95	62	Yes	Yes	ICF	Yes	Yes
CATALOG.RSPLEX01.OMGR.CAT1	OMP100	47185920	47923200	1	180	4096	98	64	Yes	Yes	ICF	Yes	Yes
ICF.RSPLEX01.TSO.CAT1	TSP100	84049920	84787200	1	180	4096	99	114	Yes	Yes	ICF	Yes	Yes
USERCAT.VZ3IMS1	Z3IMS1	737280	7372800	0	180	4096	10	1	Yes	No	ICF	Yes	No
USERCAT.VZ3WAS2	Z3WAS2	737280	7372800	0	180	4096	10	1	Yes	No	ICF	Yes	No
USERCAT.VZ3CIC1	Z3CIC1	737280	7372800	0	180	4096	10	1	Yes	No	ICF	Yes	No
VCP1.VOLCAT.VGENERAL	MCP100	757760	3788800	0	37	20480	20	1	Yes	No	ICF	Yes	No
CAM11.USER.CATALOG	DBP147	737280	7372800	0	180	4096	10	1	Yes	Yes	ICF	Yes	No
CATALOG.MVSICF1.VUCM100	DBP142	737280	7372800	0	180	4096	10	1	Yes	Yes	ICF	Yes	No
CATALOG.MAINSTAR.C26785	R1P11C	737280	7372800	0	180	4096	100	1	Yes	Yes	n/a	Yes	Yes
CATALOG.RSPLEX01.HAA.CAT1	DBP150	737280	7372800	0	180	4096	10	1	Yes	Yes	ICF	Yes	No
CATALOG.RSPLEX01.HAA.CAT2	DBP144	737280	7372800	0	180	4096	10	1	Yes	Yes	ICF	Yes	No
CATALOG.RSPLEX01.HAA.CAT3	DBP12F	737280	7372800	0	180	4096	10	1	Yes	Yes	ICF	Yes	No
CATALOG.RSPLEX01.HAA.CAT5	DBP148	737280	7372800	0	180	4096	10	1	Yes	Yes	ICF	Yes	No
CATALOG.RSPLEX01.MQS.CAT1	MQP100	737280	7372800	0	180	4096	10	1	Yes	Yes	ICF	Yes	Yes
CATALOG.RSPLEX01.MASTER	MCP100	2211840	7372800	0	180	4096	30	3	Yes	No	ICF	Yes	Yes

Hub Time: Fri, 06/08/2007 09:43 AM
Server Available
Catalog Summary - tep-srv - RPENNY

# IBM Tivoli Advanced Backup & Recovery for z/OS

- Single Toolset to automatically:
  - Identify critical application data
  - Track & Validate Backups
    - Where they are
    - Currency
    - Supporting removable or non-removable media types
  - Recover **Fast** from Disasters or Local Outages
    - Either at Local or DR site
    - From one central location
    - With one simple process
  - Eliminates guesswork and manual processes
    - Provides assurance that the data needed for the business to be resilient and compliant is protected and can be recovered from any type of outage, with documented evidence of the recoverability



# TEP: Application Backup Events

Application Backup Events - TEP-BLANK - SYSADMIN

File Edit View Help

Navigator View: Physical

- Enterprise
  - Windows Systems
  - z/OS Systems
    - DVLP
      - Advanced Backup and Recovery
        - CANSDSST:DVLP:RV
          - ACDI Application Names
          - ABM Application Attributes with :
          - Application Backup Events**
          - CBTI BKUPEND Events
          - CBTI Application Backup Event:
          - Filter Attribute Group

Physical

Report Page: 1 of 5

ABARS Event Name	Incremental Version	Base Version	Type of Backup	Status of Backup	ITABR Return Code	Utility Return Code	Event Timestamp
\$MGTAPPL	0	0	B	COMPLETE	0	0	07/05/07 13:56:4
BB1	0	0	B	COMPLETE	0	0	10/12/01 17:08:1
BB1	0	-1	B	COMPLETE	0	0	10/12/01 17:00:0
BB2	0	0	B	COMPLETE	0	0	09/11/01 17:00:2
BB2	0	-1	B	ERRORs EXIST	0	0	09/11/01 16:48:0
BK000001	0	-1	BI	INCOMPLETE	-1	-1	09/01/00 13:46:0
BK000001	-15	0	BI	COMPLETE	0	0	09/01/00 13:57:5
BK000001	-14	0	I	COMPLETE	0	0	09/01/00 14:04:4
BK000001	-13	0	I	COMPLETE	0	0	09/13/00 15:29:3
BK000001	-12	0	I	COMPLETE	0	0	09/15/00 10:13:3
BK000001	-11	0	I	COMPLETE	4	0	11/10/00 13:22:4
BK000001	-10	0	I	COMPLETE	0	0	01/03/01 17:46:4

Events with Non-Zero Return Code Page: 1 of 5

Events Resulting in >= 300 Datasets Backed Up Page: 1 of 5

Hub Time: Mon, 09/08/2008 05:08 AM Server Available Application Backup Events - TEP-BLANK - SYSADMIN

# IBM Tivoli Allocation Optimizer for z/OS

## Allocation Optimizer:

- Enables users to avoid and recover from X37 type abends such as B37, D37, and E37 abends
- Handles all DASD data sets, both SMS and non SMS-managed (VSAM and non-VSAM). Used with SMS, ***all*** unsuccessful DASD allocations are eligible for recovery
- Maximizes use of the current volume before attempting to allocate additional volumes - dynamically adjusting catalog and control blocks only when an extent is needed
- Limits fragmentation of a data set on a single volume and across multiple volumes, preserving valuable catalog space and memory-based control block storage

```

Session A - rs25 mod3 - [32 x 80]
Tivoli Allocation Optimizer Recovery Statistics

Statistics recording started at 01/03/2005 16:16:03      Subsystem ID AOSH

Initial volume primary space allocation failures recovered..... 137
Subsequent volume primary space allocation failures recovered.... 0
Undefined secondary allocation space abends avoided (D37)..... 435
Unavailable secondary allocation space abends avoided (B37/E37)... 43
Unavailable secondary allocation space abends recovered (B37/E37). 77
Insufficient volumes defined abends recovered (B37/E37)..... 1691
Possible insufficient space abends avoided (B37/E37)..... 254
Space release option added to primary or secondary allocation.... 27
Insufficient PDS directory space for member save errors recovered. 0

*****
*
* Total number of abends and errors either avoided or recovered      2664  *
*
* Number of tracks recovered from adding space release                354   *
*
*****
  
```

# Allocation Optimizer – Summary Screen

Welcome SYSADMIN  
Tivoli Enterprise Portal

File Edit View Help

View: Physical

Subsystem Summary

Subsystem	Count
AOPT	11

ITAO Summary by Event Type

Event Type	Event Count
NOTCAT2 SCRATCH	1
NOTCAT2 JCLFAIL	1
Space release added	1
Insufficient PDS directory blocks	1
Insufficient volumes	1
Excessive secondary extent	2
Secondary allocation space failure	1
Insufficient secondary space	1
No secondary space specified	1
Insufficient initial primary space	1

ITAO Event Detail

Record Time	Event Processed	Job	Step	Procedure Step	DD	Dataset	SMS Managed	SMS Data Class	SMS Storage Class	SMS Management Class
10/14/07 23:23:56	NOTCAT2 JCLFAIL	TEHRLVP1	NOTCAT2		SYSUT5	TEHRL2.NONSMS.S3410R14.GLO.TEST.DATA	NO			
10/14/07 23:23:56	NOTCAT2 SCRATCH	TEHRLVP1	NCATSCR		SYSUT7	TEHRL2.NONSMS.S3410R14.GLO.TEST.DATA	NO			
10/14/07 23:23:55	Insufficient PDS directory blocks	TEHRLVP1	DIRINC		DD21	TEHRL2.NONSMS.S3410R14.GLO.TEST.DATA	NO			
10/14/07 23:23:52	Insufficient volumes	TEHRLVP1	VOLADD		SYSUT4	TEHRL2.NONSMS.S3410R14.GLO.TEST.DATA	NO			
10/14/07 23:23:52	Space release added	TEHRLVP1	SECREL		SYSUT2	TEHRL2.NONSMS.S3410R14.GLO.TEST.DATA	NO			
10/14/07 23:23:51	Secondary allocation space failure	TEHRLVP1	SECRED		SYSUT3	TEHRL2.NONSMS.S3410R14.GLO.TEST.DATA	NO			
10/14/07 23:23:51	Excessive secondary extent	TEHRLVP1	SECINC		SYSUT2	TEHRL2.NONSMS.S3410R14.GLO.TEST.DATA	NO			
10/14/07 23:23:51	Excessive secondary extent	TEHRLVP1	SECINC		SYSUT2	TEHRL2.NONSMS.S3410R14.GLO.TEST.DATA	NO			
10/14/07 23:23:51	Insufficient secondary space	TEHRLVP1	SECBEST		SYSUT2	TEHRL2.NONSMS.S3410R14.GLO.TEST.DATA	NO			
10/14/07 23:23:50	No secondary space specified	TEHRLVP1	SECALLOC		SYSUT2	TEHRL2.NONSMS.S3410R14.GLO.TEST.DATA	NO			
10/14/07 23:23:50	Insufficient initial primary space	TEHRLVP1	PRIMRED		SYSUT2	TEHRL2.NONSMS.S3410R14.GLO.TEST.DATA	NO			

Hub Time: Mon, 10/15/2007 03:38 PM    Server Available    Allocation Optimizer Event Activity - 9.52.104.198 - SYSADMIN \*ADMIN MODE\*

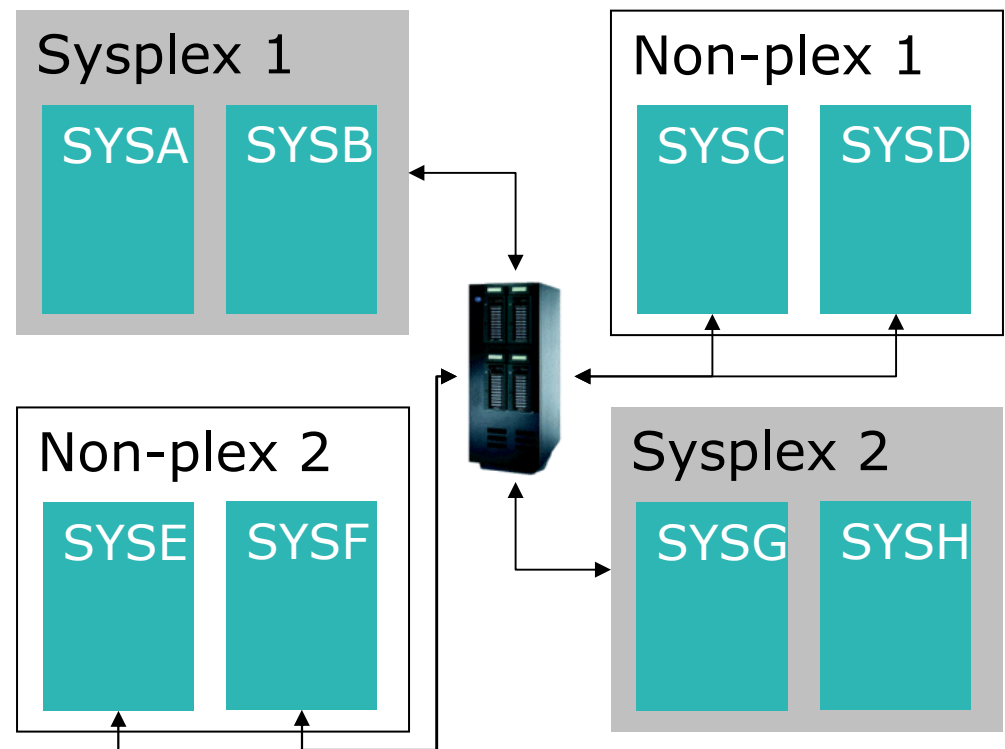
# IBM Tivoli Automated Tape Allocation Manager for z/OS

- **Automated Tape Allocation Manager (ATAM):**

- ◆ Enables customers to share existing tape devices between multiple images: sysplex, nonplex, multiple standalone in any combination including legacy devices such as 3420

- **Improves Operational Efficiency:**

- ◆ Maximize the use of existing tape devices
- ◆ Reduce operational overhead
- ◆ Minimize backlogs of job requests
- ◆ Improve the ROI on tape hardware investments
- ◆ Support hardware acquisition decisions
- ◆ Architecture: Since ATAM operates at the Hardware Level, it exploits the fact that an autoswitchable device can only be online and allocated to one system at a time
- ◆ Availability: Single Point of Control without the Single Point of Failure – ATAM does not need to coordinate device allocation information through a shared control file
- Responds automatically and directly to user/job resource requests
- Responds to requests at “machine speed” instead of “operator speed”
- Real-time and historical reporting – built-in





# Graphical view of ATAM

Unit	System Name	Selectable	Online	Allocated	Pending Offline	Mount Pending	Allocations	Jobr
0500	RS06	Yes	No	No	No	No	0	.....
0500	RS07	Yes	No	No	No	No	0	.....
0501	RS06	Yes	No	No	No	No	0	.....
0501	RS07	Yes	No	No	No	No	0	.....
0531	RS06	No	No	No	No	No	0	.....
0531	RS07	No	No	No	No	No	0	.....
0532	RS06	No	No	No	No	No	0	.....
0532	RS07	No	No	No	No	No	0	.....
0533	RS06	No	No	No	No	No	0	.....
0533	RS07	No	No	No	No	No	0	.....
0534	RS06	No	No	No	No	No	0	.....
0534	RS07	No	No	No	No	No	0	.....
0535	RS06	No	No	No	No	No	0	.....
0535	RS07	No	No	No	No	No	0	.....
0540	RS06	No	No	No	No	No	0	.....
0540	RS07	No	No	No	No	No	0	.....
0541	RS06	No	No	No	No	No	0	.....
0541	RS07	No	No	No	No	No	0	.....
0542	RS06	No	No	No	No	No	0	.....
0542	RS07	No	No	No	No	No	0	.....
0543	RS06	No	No	No	No	No	0	.....
0543	RS07	No	No	No	No	No	0	.....
0590	RS06	No	No	No	No	No	0	.....
0590	RS07	No	No	No	No	No	0	.....
0591	RS06	No	No	No	No	No	0	.....
0591	RS07	No	No	No	No	No	0	.....
0592	RS06	No	No	No	No	No	0	.....

## IBM's System z Storage Management Future Directions



**Questions ????**

**Thank You!**