IBM Software Group

Securing and recovering your business data with Tivoli storage products

Tivoli software

ON DEMAND BUSINESS

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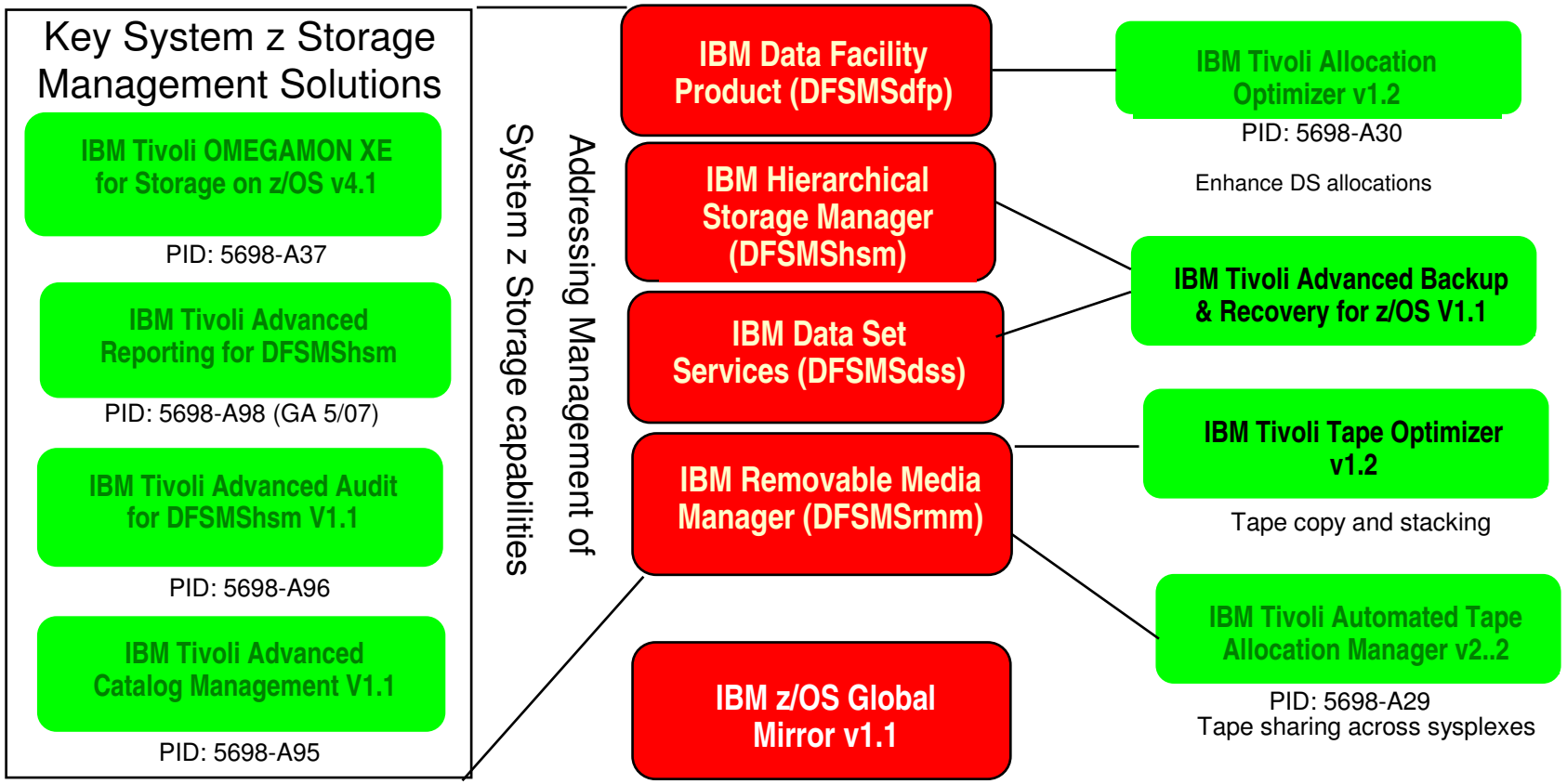
AGENDA

- Overview of the IBM Tivoli zStorage Solution benefits
- Introduction to IBM Tivoli zStorage Initiative
- Securing and recovering you business data
- Questions

System z Storage Management Solution Benefits

- Solve zStorage management issues with:
  - Space, Performance, Administration, DFSMShsm, ICF Catalogs, Off Line Storage, Problem Avoidance, Resources (DASD, Channel, Cache, Tape Drives, etc.)
- Reduce problems
  - Precise alerts tailored to your environment
  - Avoid catastrophic outages
  - Automated actions based on alerts
- Maximize efficiency
  - Dramatically reduce time to audit and correct DFSMShsm errors
  - Efficiently utilize resources (online and offline storage)
- Securing and recovering business data
  - Identify critical data for backing up
  - Track and validate currency
  - Recover quickly
  - Comply with regulatory / audit requirements (e.g. Sarbanes-Oxley)
- Productivity through integration
  - Offerings complement each other and will become more tightly integrated
  - Seamless integration to other TEP enabled IBM products

Integrated System z Storage Management Solutions



System z Storage ***Management function***

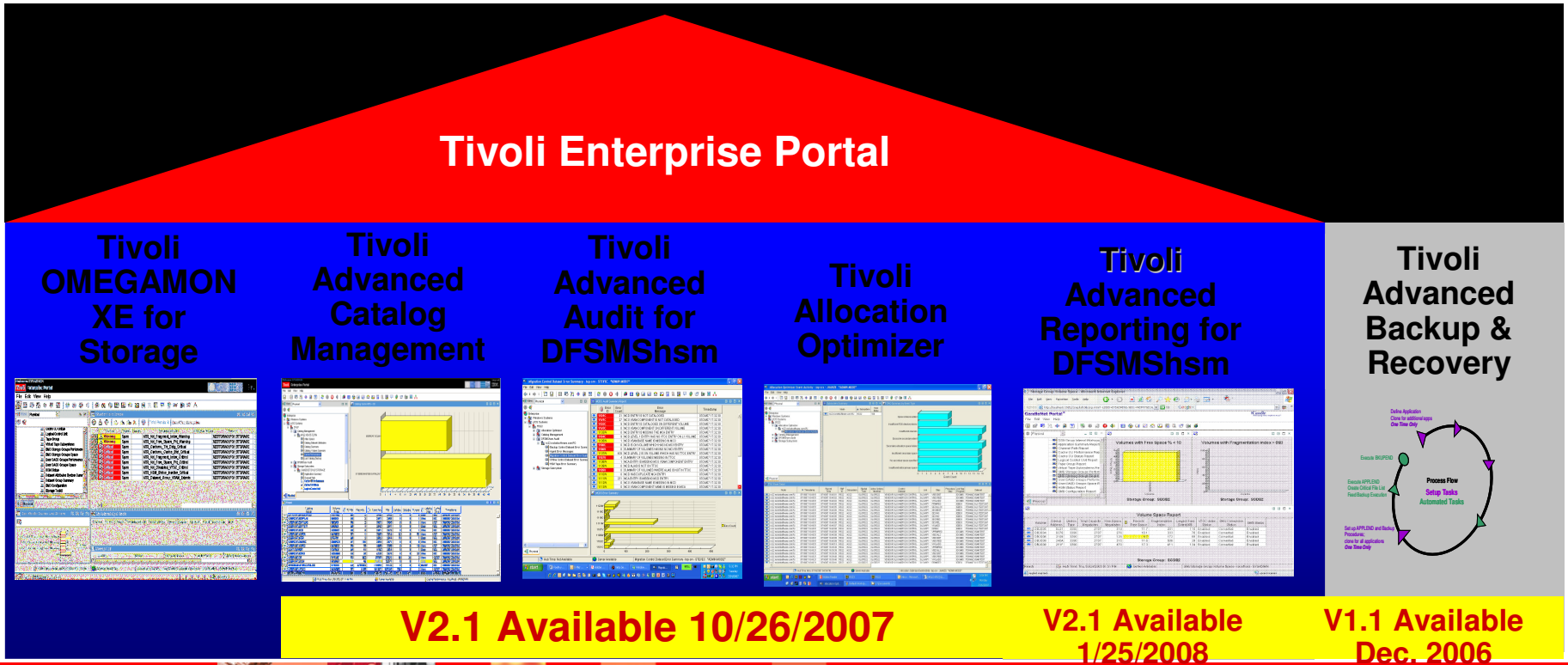
System z ***Storage functions***

Additional System z Storage ***Management function***

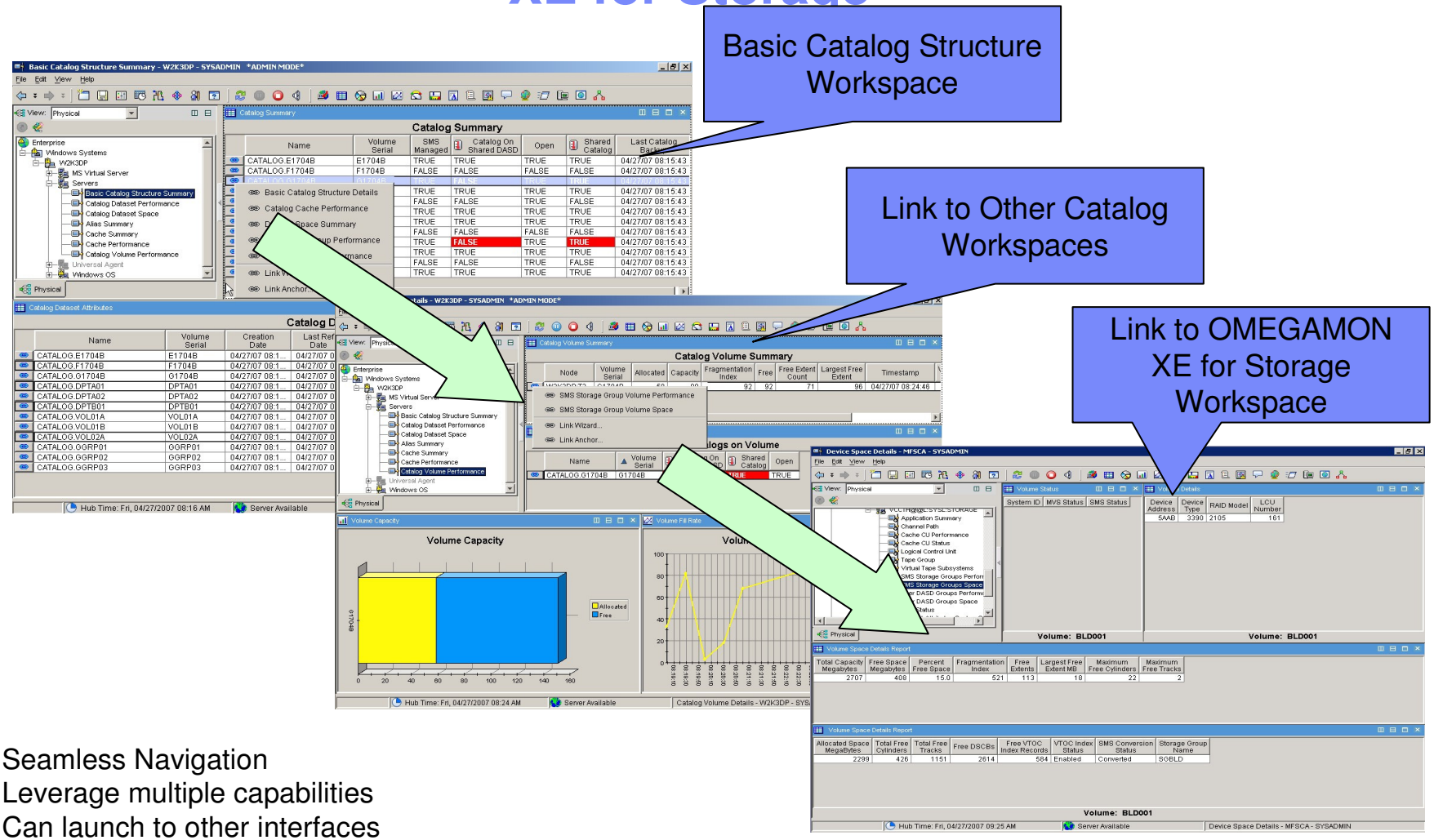
IBM Tivoli Integrated System z Storage Management

IBM's System z Storage Management Provides:

- Powerful Integration of related System z Storage information via the Tivoli Enterprise Portal (TEP)
- Robust Tools for monitoring and managing System z Storage
- Dynamic linking and capability to take action directly from the TEP
- Standardize System z Storage Toolset - Reduce dependency on zStorage Management 'gurus'
- Simpler maintenance & upgrade – all use standard IBM SMP/E packaging
- Reduce usage of System z Resources – reduce cost and energy usage



Integration - Linking to Other Catalog Workspaces & XE for Storage



- Seamless Navigation
- Leverage multiple capabilities
- Can launch to other interfaces

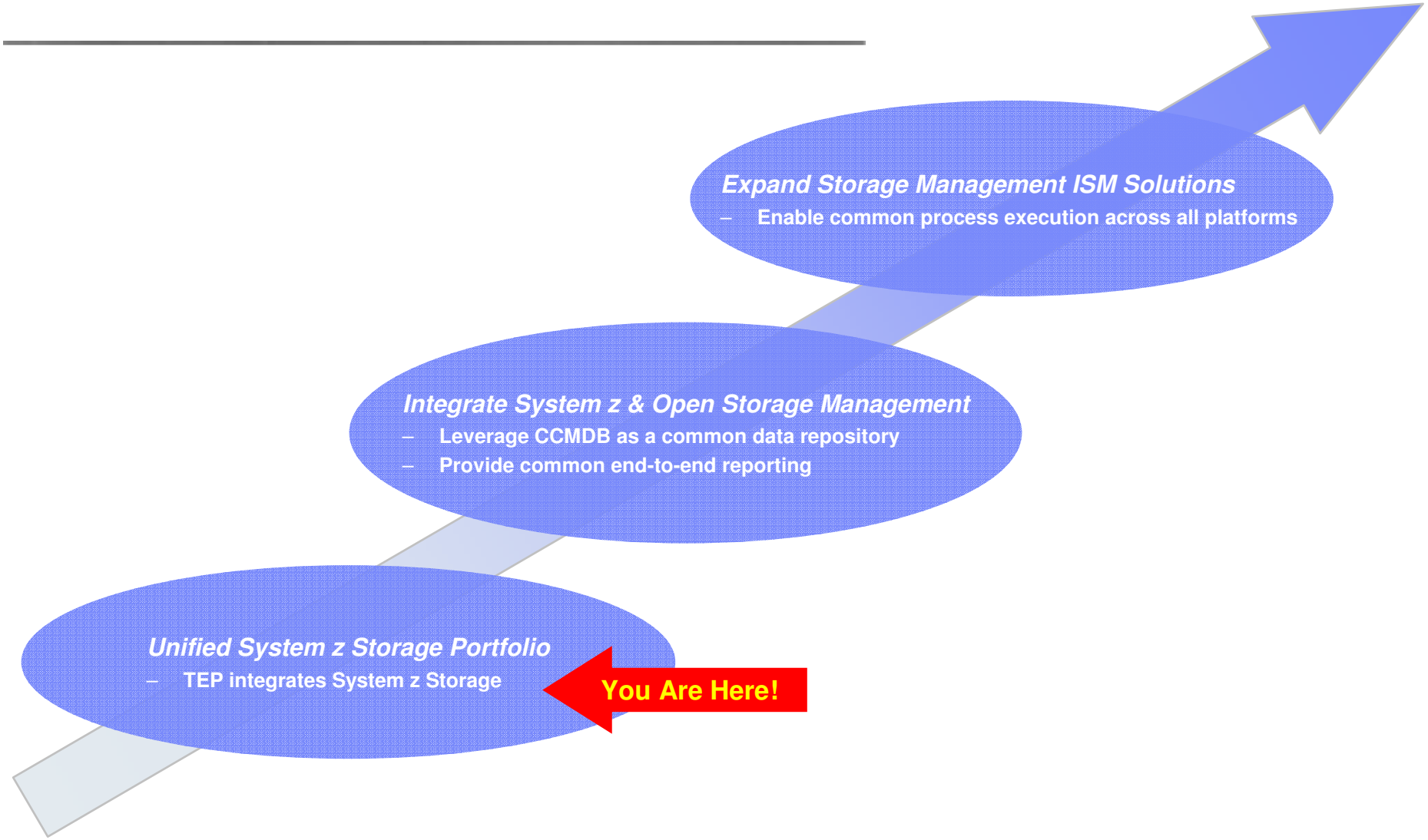
System z Storage Management Solution Working Together to Provide Value

- IBM Tivoli OMEGAMON XE for Storage on z/OS
  - Monitor and manage in both real-time and historical space, performance, offline storage, DFSMShsm activity, DFSMSdss, track applications (ASIDs), take actions and expert advise minimizing and avoiding outages while improving efficiency
  - Integration with other solutions via TEP, cornerstone in a storage management tool box
- IBM Tivoli Advanced Backup & Recovery for z/OS
  - Automatically identify critical datasets, ensure backups w/o duplication, quickly recover from disasters or local outages
- IBM Tivoli Advanced Catalog Management
  - Provides the capability to manage your ICF Catalogs, audit alias, view structures, and make sure that your ICF catalogs and tape environments are backed up appropriately for forward recovery, preventing costly outages
- IBM Tivoli Advanced Reporting for DFSMShsm
  - Provides deep dive reporting of DFSMShsm logs, identify inefficient HSM migrations, maximize the efficiency of your DFSMShsm day to day activity and environment
- IBM Tivoli Advanced Audit for DFSMShsm
  - Ability to quickly audit, identify and correct DFSMShsm errors that cause costly outages, waste of resources, and time
- IBM Tivoli Allocation Optimizer
  - Ensures no costly space allocation problems by avoiding X37 abends & NOTCAT2 conditions
- IBM Tivoli Automated Tape Allocation Manager
  - Share tape resources in across sysplexes, or in a non-sysplex environment, maximizing your investment
- IBM Tivoli Tape Optimizer
  - Tape copy and stacking solution for data residing on tape storage devices

Additional System z Storage Management Solutions Related Products

IBM Tivoli Output Manager	Captures and distributes enterprise data from z/OS applications
IBM Tape Manager for z/VM	Tape and device management for z/VM systems. Includes sharing devices with other z/VM and non-z/VM systems
IBM Backup and Restore Manager for z/VM	Provide backup and restore capabilities for z/VM and guest data (such as Linux)
IBM Archive Manager for z/VM	Manage z/VM disk space more efficiently by archiving infrequently used files, recalling as needed

IBM End-to-End IBM Storage Management Direction



IBM Tivoli
Advanced Backup and Recovery
for z/OS

Advanced Backup and Recovery

- Functional Components
  - Automated Critical Data Identification (ACDI)
    - Identifies application data used by real-time monitoring of application jobs
    - Builds critical data set name list as input to backup processes
  - Critical Backup Tracking/Inventory (CBTI)
    - Tracks and inventories volume and data set backup utilities
    - Provides easy search and locate all backups function
    - Dynamically builds restore jobs
  - ABARS Manager (ABM)
    - Front-end and back-end to DFSMShsm ABARS function
    - Monitors and inventories ABARS activities
    - Provides ABARS incremental backup function
    - Provides D/R site ICF catalog synchronization function

Automated Critical Data Identification

- Automation is Key
  - Identify critical application data
  - Populate list of critical data set names
  - Dynamically detect application changes
- Real-Time Selection Process (RSP)
  - Started task
    - Executes continuously to collect SMF and JCL data
  - Tracks batch and started task executions by job name
    - Wherever they execute
    - Each and every time they execute
    - Each cycle
      - Daily, weekly, monthly, quarterly, annually

Automated Critical Data Identification

- Automated JCL Capture
  - Records all data sets referenced in the JCL
    - Uses the standard IEFUJI SMF exit
      - Same exit used by JCL validation products
    - Steps not executed (condition code skip)
    - Not opened by the program
    - Concatenated libraries not opened
  - Explodes cataloged procedures used

- Automated SMF Record Capture
  - Records data set usage
    - Uses the standard IEFU83 SMF exit
    - Identifies all data sets used through SMF records
      - Opened and closed
      - Deleted or renamed
      - Allocated; even those dynamically allocated

Automated Critical Data Identification

- **Creation of the Critical Data Set List**
  - Supports multiple data movers
    - DFSMShsm ABARS format
      - Selection Data Set control cards
    - DFDSS format
      - Logical backup control cards
    - List format
      - Sequential list
- **Maintenance of the Critical Data Set List**
  - List of critical data sets is rebuilt
    - Every time the application executes
      - Finds new data sets added to the application since the last execution
      - Removes data sets that have been deleted
      - Finds data sets from new jobs added to the application since the last execution
  - Eliminates the need to manually update the list

Automated Critical Data Identification

- Application Tracking by Job Names
  - Application Job Collection Methodologies
    - Batch interface into scheduling systems
      - CA7
      - CONTROL_M
      - ESP
      - JobTRAC
      - TWS (OPC)
      - ZEKE MVS
    - Job name masks or user defined job list

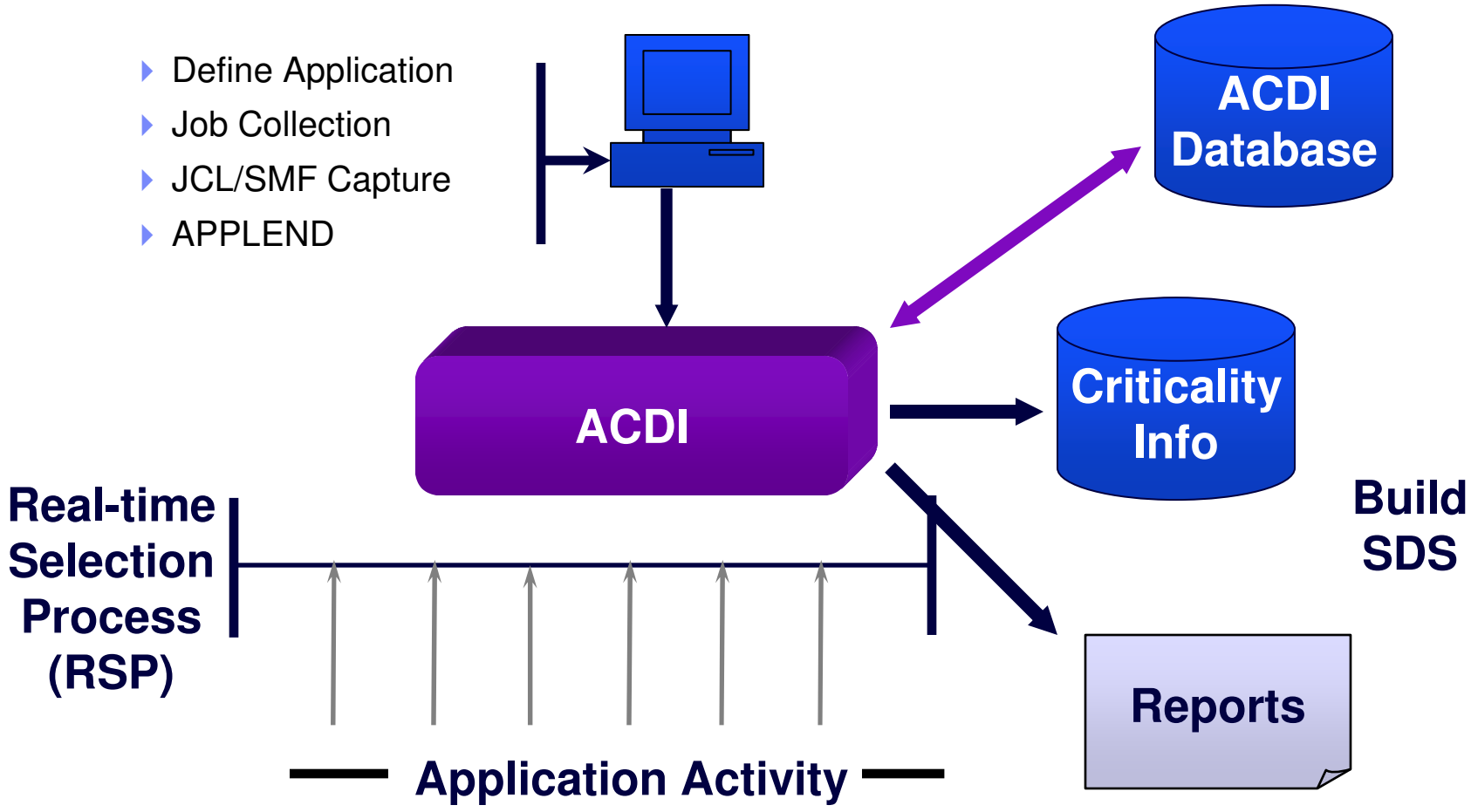
- Signal End of Application - APPLEND batch job
  - Program can be scheduled after the last job in the application cycle
    - Marries the JCL and SMF data collected
    - Analyzes and processes all filters and/or overrides
    - Builds the selection data set (ABARS, DFDSS, other)
    - Can trigger the execution of the backup job

Automated Critical Data Identification

- Filters
  - Change criticality decisions
    - Include to exclude
    - Exclude to include
    - Discard data from specific volumes (system, mirrored, other)
  - Include data sets not regularly used by the application
    - Application toolbox, Disaster/Recovery, other
  - Three levels
    - Universal - apply to all applications
    - Global - apply selectively to multiple applications
    - Local - apply to specific application

Automated Critical Data Identification

- Define Application
- Job Collection
- JCL/SMF Capture
- APPLEND



Automated Critical Data Identification

- IBM's Automated Critical Data Identification Solution
  - Eliminates costs associated with:
    - Manual effort to identify critical data
    - Maintaining the critical data set name list over time
  - Mitigates risks associated with:
    - Not mirroring critical data
    - Not identifying critical data for backup
    - Not updating critical data lists when applications change
  - Assists customers in meeting Sarbanes-Oxley and other government or industry regulations
    - Automation to identify critical data
    - Used by CBTI reports to prove critical data is protected

Critical Backup Tracking/Inventory

- Functional Overview
  - Tracks and inventories
    - All backup copies of data
    - Data backed up using multiple procedures
      - Full volume dumps, utility backups, other
      - Multiple applications backing up the same data sets
  - Inventory reporting
    - Application data in the critical data set list that has been backed up
      - Proof critical data has a backup
    - Application data in the critical data set list that has not been backed up
      - Alerts
    - Other data backed up or not backed up
      - DASD volume specific
      - ICF catalog specific
      - HLQ specific

Critical Backup Tracking/Inventory

- Overview of Functionality
  - Intercepts and tracks backups without JCL changes
  - Provides visibility to all backups taken in the mainframe environment
    - Including backups taken by DFSMShsm
  - Provides recovery support
    - Single or multiple data sets
    - Entire applications
    - Dynamically generated restore jobs
  - Extensive reporting

Critical Backup Tracking/Inventory

- **Data Movers Supported**

  - DFSMSdss and FDR
    - Physical dumps
  - DFSMSdss and FDR
    - Logical dumps
  - IDCAMS
    - REPRO, EXPORT
  - IEBGENER/ICEGENER/SYNCGENR
  - IEBCOPY
  - ADARUN/GVEXPORT
  - DFSMShsm Incremental
  - DFSMShsm ARCINBAK
  - DFSMShsm AUTODUMP
  - DFSORT
  - Mainstar's ABARS Manager
  - Mainstar's CR+
  - Tivoli Advanced Catalog Management for z/OS
  - Tivoli Advanced Backup and Recovery for z/OS

Critical Backup Tracking/Inventory

- Backup Tracking
  - Backups are tracked by a seamless intercept process
    - CBTI started task
    - Triggered by matching job names, step names, and utility program names provided in a user defined table
  - Intercepts backup jobs without JCL changes
    - Examines backup results
    - Records backup results in ITABR Inventory Data Set
- Inventory
  - Provides a centralized inventory of backups
    - Full Volume Dumps
    - z/OS utilities
    - ABARS Manager
    - DFSMShsm incremental and AUTODUMP
  - Local and off-site disaster recovery support
  - Tracks multiple generations of backups

Critical Backup Tracking/Inventory

- Key Information Recorded
  - Volume names (where applicable)
    - Input and output
  - Job names
  - Job groups
  - Date and time
  - Data set names
  - Multiple backups
  - Number of data sets
  - Size of each data set
  - DSCB and catalog information

Critical Backup Tracking/Inventory

- Recovery Support
  - Locate desired backup by selecting:
    - Volume
    - Data set name or mask
    - Job or mask
  - Restore data
    - All or selected data sets
  - Recovery JCL is automatically built
    - Using pre-set customization parameters
  - Restore any data set, anytime, anywhere

Critical Backup Tracking/Inventory

- **Reporting**
  - Overlap by Dataset
  - Overlap by Backup Event
  - Overlap by Job Groups
  - Dataset List
  - Dataset List by Jobname w/Outputs
  - Full Volume Dump List
  - Jobname List
  - Jobnames Not Tracked by a Job Group
  - What Isn't Backed Up
  - Critical in ACDI with No CBTI Backup Record
  - Critical in ACDI with CBTI Backup Record
  - BKUPEND Summary Report
  - Overlap by BKUPEND Application
  - TapePull Report

Critical Backup Tracking/Inventory

- Overlap Reports
  - Identify data sets backed up by multiple jobs and processes
    - z/OS utilities
    - Full Volume Dumps
    - ABARS Manager
    - DFSMS Incremental and AUTODUMP
  - Identify redundant backups
    - Resource consumption reduction opportunities

- What Isn't Backed Up Report
  - Determine 'what isn't backed up' to ensure you are not missing critical data sets
  - Compare the data sets on volumes, listed in ICF user catalogs, by data set name or masks:
    - To the ITABR Inventory Data Set
    - Optionally to the DFSMShsm BCDS
  - Identify data sets that are not recorded and thus, have not been tracked or backed up

Critical Backup Tracking/Inventory

- Critical in ACDI with No CBTI Backup Record Report
  - Critical data set list created by APPLEND process
  - Backup records created by ACDI tracking
  - Compare critical data set list to backup records
  - Identify critical data sets not backed up
  - Take corrective action

- Critical in ACDI with CBTI Backup Record Report
  - Critical data set list created by APPLEND process
  - Backup records created by ACDI tracking
  - Compare critical data set list to backup records
  - Identify critical data sets backed up
  - Prove compliance or satisfy audits

Critical Backup Tracking/Inventory

- DFSMShsm Incremental Backups and the HRECOVER command
  - Allows Storage Administrators and others to:
    - Determine which DFSMShsm backups are recorded in the BCDS
    - Select the backup generation you want to restore
    - Recover data sets without knowing the HRECOVER syntax
    - Perform advanced functions
      - Rename, redirect to non-DFSMS
- DFSMShsm AUTODUMP volume or data set restores
  - Allows Storage Administrators and others to:
    - Determine which DFSMShsm volume dumps are recorded in the BCDS
    - Select the volume from which you want to restore
    - Recover the entire volume or selected data sets

Critical Backup Tracking/Inventory

- IBM's Critical Backup Tracking/Inventory Solution
  - Intercepts and tracks backups *without* JCL changes
  - Provides local or disaster recovery restore support
  - Inventories and centralizes z/OS backups
  - Quickly locates all data set backups, choose the appropriate backup and restore with the touch of a finger
  - Identifies data sets backed up multiple times that may be unnecessary
    - Resource consumption reduction opportunities
  - Determine 'what isn't backed up' to ensure you are not missing critical data sets
  - Demonstrate compliance by proving critical application data is backed up

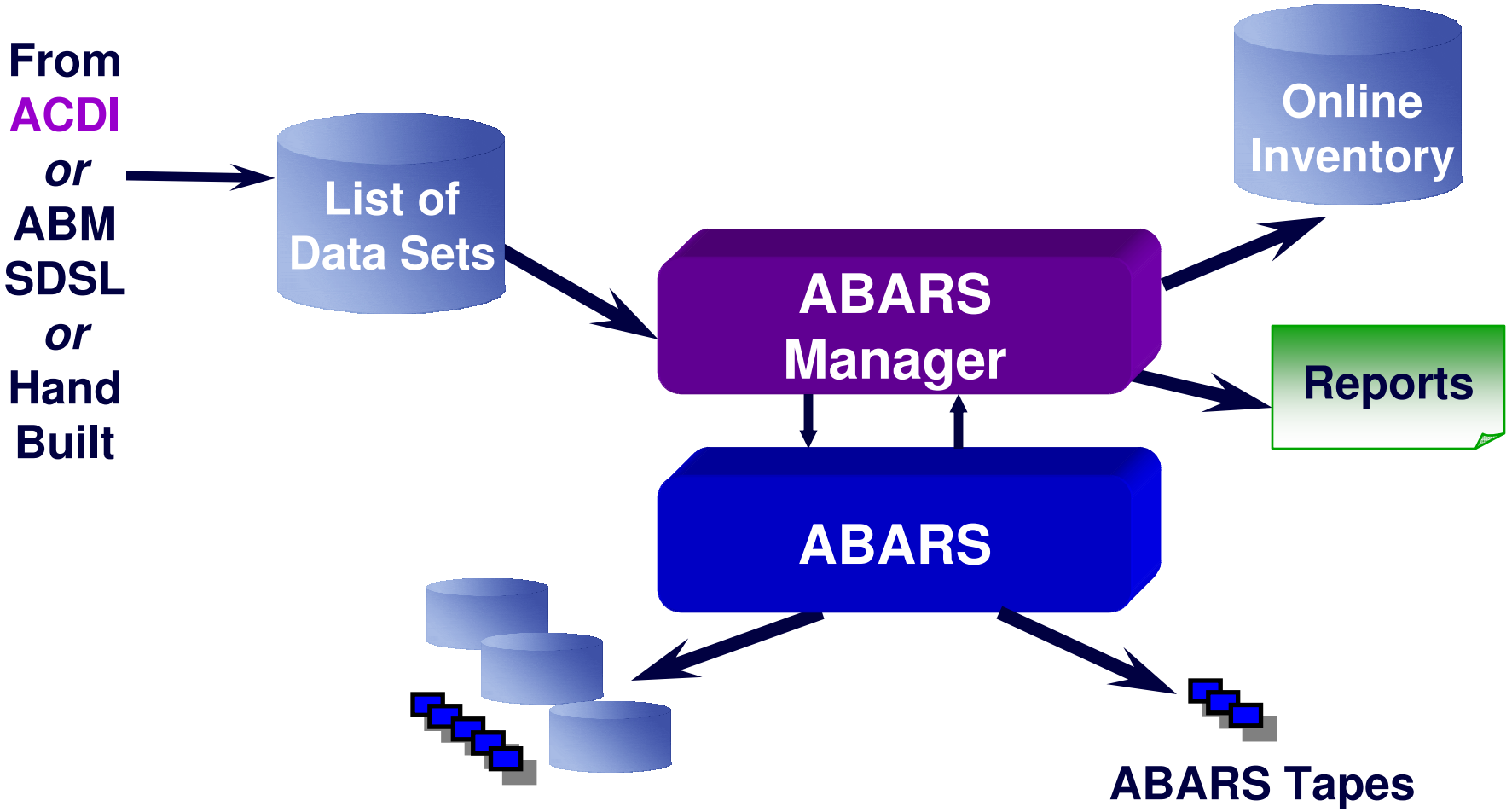
ABARS Manager

- Functional Overview
  - Centralizes management of ABARS functions
    - Aggregate Backup and Recovery submission and tracking
    - Aggregate Backup and Recovery results inventory
      - Data set names, sizes, attributes
  - Significantly extends ABARS functionality
    - Incremental backup
    - Reporting
    - Powerful backup inventory search and restore facility

ABARS Manager

- Front-end to native ABARS
  - Batch job submitted in production or from ABM ISPF panels
  - Inspects and optionally modifies the ABARS Selection Data Set (SDS)
    - Remove uncataloged data set names
    - Remove unchanged data set names for incremental backups
    - Change backup categories (INCLUDE, ALLOCATE or ACCOMPANY)
  - Submit ABARS commands to DFSMShsm
    - ABACKUP and ARECOVER
- Back-end to native ABARS
  - Inspect native ABARS activity results
    - ABARS Activity Logs
  - Record results
    - Date and time
    - Data set names backed up or recovered
    - ABARS output data set names and volume serials

ABARS Manager



ABARS Manager

- Backup Management
  - Maintain an online inventory of aggregate backups
    - User specified number of generations
  - Record information for data sets backed up by ABARS
    - Names, sizes, attributes, volume serials, other
  - Reduce ABARS backup failures
    - Dynamically modifies Selection Data Set
  - Quantify disaster recovery space requirements
    - Online DASD, migration and user tape
    - For selected aggregates
  - View ABARS results directly from inventory
    - ISPF interface
    - All or selected aggregates
    - Activity logs, Selection Data Sets, error messages, statistics, other

ABARS Manager

- Recovery Management
  - Submit aggregate or selected data set recovery jobs
    - ISPF interface
    - Prioritize by application
    - Access online inventory of aggregate backups
      - Choose from multiple generations and select recovery options
    - Record information for data sets recovered
      - Names, sizes, attributes, volume serials, other
    - Restart failed recoveries
      - Edit ABARS CONFLICT and RESTART data sets
  - Search inventory for data set recovery
    - Specific or masked data set names
    - Locate all available backups
    - Recover using selected generation
  - View recovery results directly from inventory
    - Activity logs, error messages, statistics, other

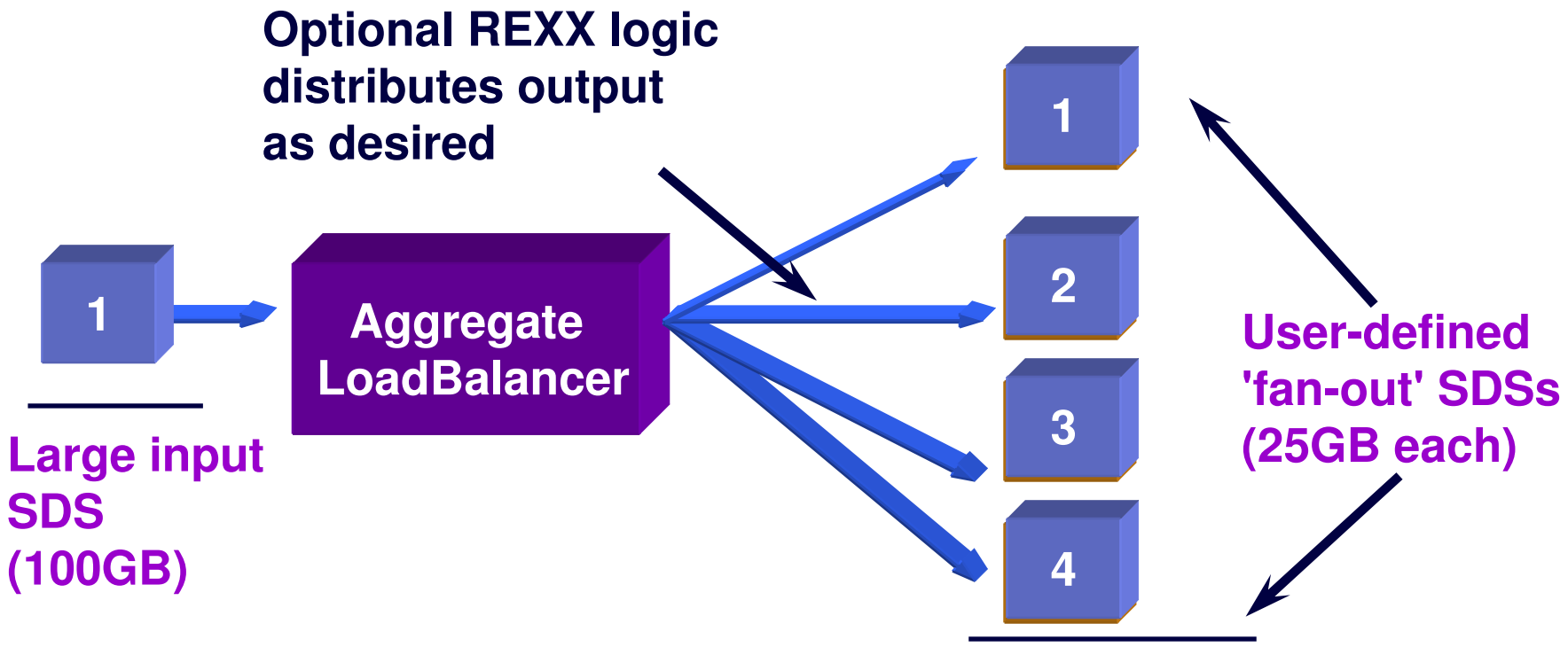
ABARS Manager

- ABARS Incremental Backup
  - Benefits
    - Reduce amount of application data backed up
    - Reduce backup time required and application down time
  - Started Task monitors application data change activity
    - Intercepts SMF data
      - Does not use VTOC DSCB change flag
    - Identifies changed data for selected applications
    - Influences Selection Data Set contents
  - Scenario
    - Base backup for all critical data on Monday
    - Incremental backups for changed critical data Tuesday through Friday
  - Automatically recover from base and incremental backups
    - Use a single RECOVER command
    - Restore most recent version of each data set from base and incrementals

ABARS Manager

- Aggregate LoadBalancer
  - Dynamically split ABARS aggregate Selection Data Sets
    - Large quantity of data to backup
    - DASD versus tape data
    - Online versus migrated data
    - Benefits
      - Limited sized aggregates
      - Parallel backup processing
      - Reduced backup window requirements
  - Dynamically combine ABARS aggregate Selection Data Sets
    - Small quantities of data to backup
    - Benefits
      - Combine small aggregates
      - Reduce backup resources and complexity

ABARS Manager



ABARS Manager

- CATSCRUB
  - Synchronize ICF Catalogs with environment at D/R site
    - After DASD volumes and catalogs restored
    - Identify application data cataloged but not restored
    - Optionally uncatalog missing data sets
      - DASD
      - Migration (ML1 and ML2)
      - User tape
  - Special features
    - Selected catalogs
    - Simulate mode
    - Many times faster than using IDCAMS utility

ABARS Manager

- Reporting
  - Comprehensive reports and queries
    - D/R site space required for recovery by application
    - Tape pull lists by application
    - Data sets backed up by multiple application backups
    - Application level backup and recovery status
    - Backup and recovery errors
    - Data sets recovered by multiple applications

ABARS Manager

- IBM's ABARS Manager Solution
  - Provides local or disaster recovery backup and recovery support
  - Inventories and centralizes ABARS backups
  - Quickly locates all data set backups, choose the appropriate backup and restore with the touch of a finger
  - Identify data sets backed up by multiple application backups
    - Prevent down leveling restored data at D/R site
  - Reduce time and resources required to perform backups
  - Split large application backups to reduce elapsed time
  - Consolidate small application backups to reduce tape usage

Advanced Backup and Recovery

- Automated Critical Data Identification (ACDI)
  - Dynamically identify critical data
  - Build critical data set name list for backup process
- Critical Backup Tracking/Inventory (CBTI)
  - Track and inventory mainframe backup utility jobs
  - Locate backups and dynamically build restore jobs
  - Provide compliance reporting
- ABARS Manager (ABM)
  - Manage and enhance ABARS usage
  - Inventory ABARS backup and recovery activities
  - Incremental ABARS function
  - Aggregate LoadBalancer function
  - CATSCRUB function
  - Provide comprehensive reporting

Questions??

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