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# IMS 12 System Enhancements and the IMS Repository

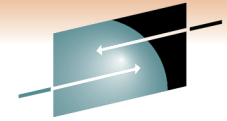
Angie Greenhaw and Diane Goff  
IBM

March 2, 2011  
Session #8573



## SHARE sessions on IMS 12

- IMS System Enhancements and the IMS Repository
  - Session # 8573      Wed. 3:00PM      Room 211A
- IMS Database and DBRC Enhancements
  - Session # 8574      Wed. 4:30PM      Room 211A
- IMS Transaction Manager Enhancements
  - Session # 8575      Wed. 6:00PM      Room 211A



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## IMS 12 System Enhancements

- Dynamic resource definition (DRD) enhancements
- Extended address volume (EAV) enhancement
- IMS logger enhancements
- System pools storage enhancement
- Command enhancements
- Syntax checker enhancements
- CQS traceability enhancements
  
- IMS repository

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# Dynamic Resource Definition (DRD) Enhancements

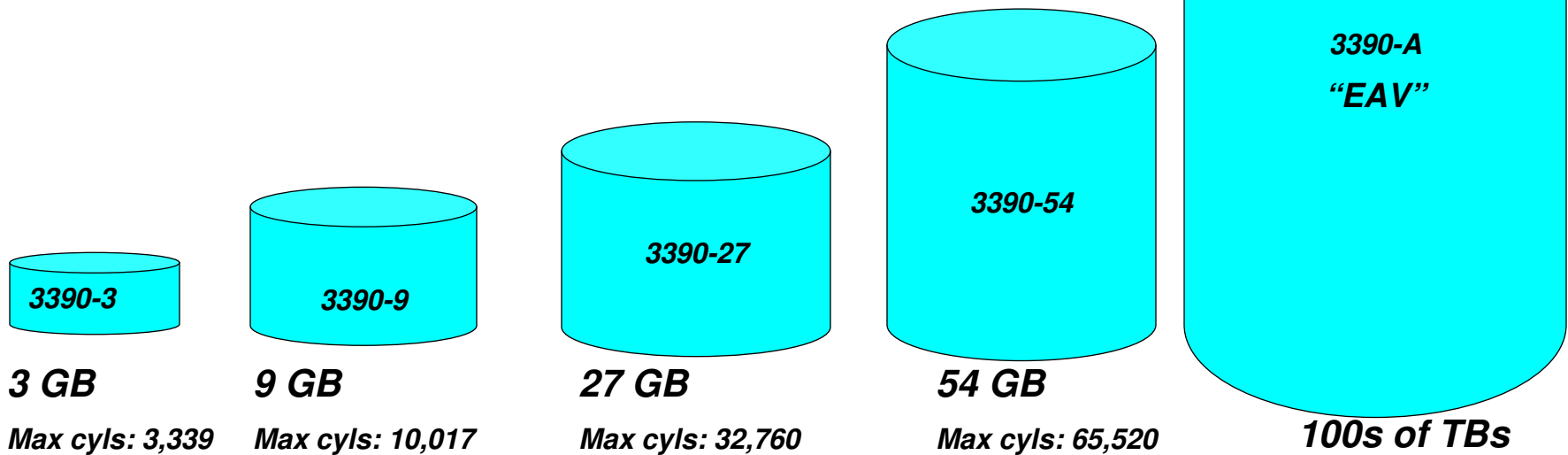
- New UPDATE option for IMPORT command
  - Previously, IMPORT could only be used for adding runtime resource definitions/descriptors that did not exist in the target IMS system
  - New IMPORT .. OPTION(UPDATE) allows existing runtime resource definitions/descriptors in the the target IMS to be changed
    - Command fails if changed definition is in use
- DRD usage of the IMS repository function
  - Previously, stored resource definitions/descriptors were kept in resource definition data sets (RDDSs)
  - New IMS repository function provides an additional method for storing stored resource definitions/descriptors
  - IMS repository will be described later in this session
- Benefits
  - Improved manageability for DRD

# Extended Address Volume (EAV) Enhancement

- IMS 12 allows certain non-VSAM IMS data sets to use EAV volumes
  - Data sets can reside in Extended Address Space (EAS) on EAV volumes
  - z/OS addressable disk storage increased beyond 65K cylinders
    - New architecture will support 100's of Terabytes on single volume
    - Storage is addressed using new 28-bit cylinder/track address
  - Requires z/OS 1.12
- IMS 11 provided support for IMS VSAM data sets to use EAV volumes

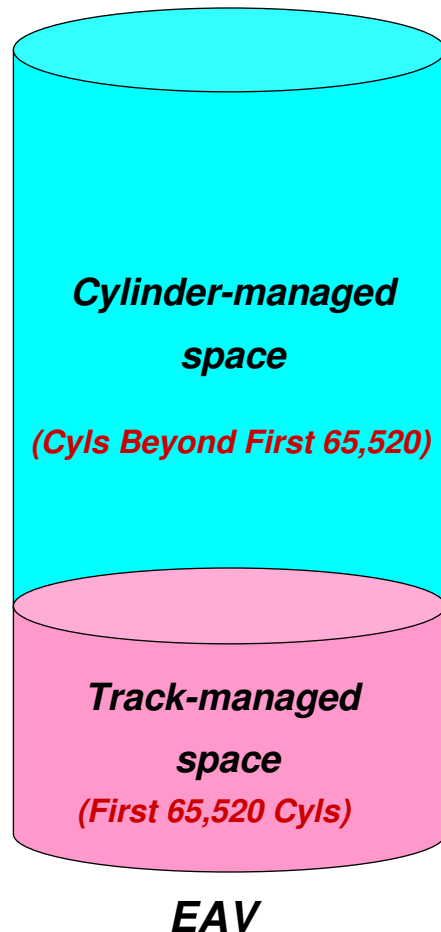
# Extended Address Volume (EAV)

- A volume with more than 65,520 cylinders
  - 3390 Model A
  - 1 to 268,434,453 cylinders
    - Architectural EAV maximum



Maximum Sizes

# EAV Key Design Points



- EAV maintains 3390 track format
  - Track-managed space:
    - Area on EAV within the first 65,520 cyls
    - Space allocated in track or cyl increments
    - Storage for “small” data sets
  - Cylinder-managed space:
    - Area on EAV located above first 65,520 cyls
    - Space is allocated in multicylinder units
    - Storage for “large” data sets
  - New DSCB format types identify EAS data sets
    - New formats (Format 8 and 9) in VTOC
    - Data set resides in cylinder-managed space

# Non-VSAM IMS Data Sets Supported

- Overflow Sequential Access Method (OSAM) data sets
  - OSAM database data sets
  - Restart data set (RDS)
  - Message queue blocks data set
  - Long and short message data set
- IMS Online Log Data Sets (OLDS)
- IMS Write Ahead Data Sets (WADS)
- IMS SPOOL data sets
- BPE External Trace Data Sets



# Extended Address Volume (EAV) Enhancement for non-VSAM data sets

- Prerequisites
  - Software requirements
    - z/OS 1.12
  - Hardware requirements
    - DS8000, DS8700
    - 3390 Model A
- Benefits
  - Supports the placement of more data sets on a single volume
  - Allow users to manage fewer numbers of larger volumes
  - Less need for multi-volume OSAM

## IMS Logger Enhancements ...

- Extended Format Support for OLDS and SLDS (optional)
- Option for log buffers above the 2-gigabyte boundary (“bar”) in virtual
- WADS management changed to be more efficient

## IMS Logger Enhancements ...

- New optional capability for OLDS and SLDS
  - IMS 12 allows OLDS and SLDS to be defined as extended format data sets
  - Use of extended format data sets allows striping
    - Striping allows multiple concurrent I/Os for sequential processing
      - *Data set is spread across multiple volumes*
      - *Increased logging rates*
- Option for log buffers above the 2-gigabyte boundary (“bar”) in virtual
  - Frees substantial amount of ECSA
  - OLDS must be in extended format with BLKSIZE 4K multiple
  - BUFSTOR=64 on OLDSDEF statement in DFSVSMxx

# IMS Logger Enhancements

- WADS management changed to be more efficient
  - Track groups no longer used
  - WADS written in wrap around fashion
  - WADS should be sized to provide enough space for any OLDS buffers not yet written at any time plus one track
  - WADS should be kept in cache in storage subsystem
- Benefits
  - Increased logging bandwidth / improved logging performance
  - ECSA constraint relief
  - Simplified WADS management for improved performance

# System Pools Storage Enhancement

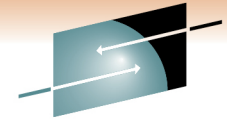
- Storage for selected database pools is obtained in 31-bit virtual storage, backed by 64-bit real storage
  - DBWP – Database work pool
  - DLDP – DMB pool
  - DLMP – CSA PSB pool
  - DPSB – DLI PSB pool
  - PSBW – PSB work pool
- Benefits
  - Reduction in 31-bit fixed real frames for fixed pools
  - Some users will now be able to fix these pools
    - Previously, they were constrained by 31-bit real storage

# Command Enhancements

- Enhancements to existing commands and new commands
  - CQS trace command enhancements
  - DBRC command enhancements
  - Dynamic database buffer pool command enhancements
  - Dynamic resource definition (DRD) command enhancements
  - Fast Path secondary index command enhancements
  - HALDB command enhancements
  - IMS Connect command enhancements
  - MSC command enhancements
  - IMS repository function command enhancements
  - OTMA command enhancements

## Command Enhancements

- Enhancements are focused on type-2 commands for the Operations Manager (OM) environment
- Benefits
  - Support of new IMS 12 functions
  - Improved manageability



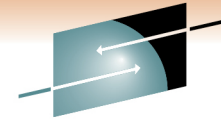
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## Syntax Checker Enhancements

- Syntax Checker supports PROCLIB members for IMS 12 / IMS 11 / IMS 10
  - IMS 9 PROCLIB members are not supported
- All previously supported members are supported
  - Newly added parameters of these members are supported
- Support added for Repository Server configuration member
- Support added to view/save parameters of members in a custom order
  - Formerly, only alphabetical order was used
- Benefits
  - Support of new IMS 12 PROCLIB members
  - Improved usability with custom order of parameters

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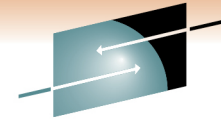


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## CQS Traceability Enhancements

- Existing CQS structure trace table (STR) can quickly fill, wrap around, and lose critical trace entries
- Two new BPE trace tables are available to track CQS structure events
  - One for overflow events (OFLW), one for structure events (SEVT)
  - Retain critical trace data for longer periods of time
- Benefits
  - Improves CQS serviceability

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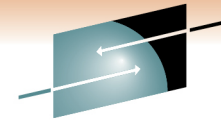


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# IMS Repository

- Overview of the IMS Repository Function
- IMS Repository Function Components
  - Repository Server (RS) address space
  - Repository catalog data sets
  - Repository data sets
  - CSL requirements and RM usage
- IMS Repository setup
  - Repository Server setup
  - Creating/enabling an IMSRSC repository for DRD
- IMS Repository commands and usage
- Migration to DRD with the repository

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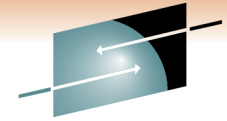
# IMS Repository Function Overview

- A 'repository' is a generalized data storage facility that can be used to store various types of information
- The IMS repository function is a centralized method for storing and retrieving resource definitions in an IMSplex
  - Enables multiple IMS systems in a multiple-IMS IMSplex to manage, store, share, and retrieve resource definitions
  - Enables a single IMS system in a single-IMS IMSplex to manage, store, share, and retrieve resource definitions
- Focus is on improving the systems management and resource management aspects of handling IMS resource definitions
  - Across multiple IMSs or for a single standalone IMS
  - For test systems, for production systems

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# IMS Repository Function Usage

- In IMS 12, the resource and descriptor definitions for Dynamic Resource Definition (DRD) can be stored in an IMS repository
  - Contains resource definitions for programs/transactions/databases/FP routing codes & descriptors
  - Called the IMSRSC, the IMS resource definition repository
  - Provides an alternative to using RDDDs (resource definition data sets) for DRD
    - Replaces one or more sets of RDDDs in an IMSplex with a single repository
  - Eliminates the need to manually coordinate and manage separate RDDDs per IMS across a multiple-IMS IMSplex
  - Provides an alternative to using MODBLKs with SYSGEN and online change
  - Considered a strategic alternative to the RDDDs
- IMS 12 can retrieve the stored resource definitions from the IMSRSC repository to dynamically generate runtime resources for DRD



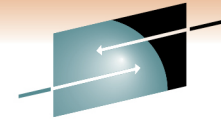
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## IMS 12 support for the DRD function ...

- DRD users in IMS 10 and IMS 11 moving to IMS 12
  - Can use existing RDDSs from IMS 10 or IMS 11 for stored resource definitions in IMS 12
  - Can use existing RDDSs from IMS 10 and IMS 11 for stored resource definitions at initial migration to IMS 12, then can migrate to the new IMSRSC repository
  - Can use the new IMSRSC repository to store definitions in IMS 12

## IMS 12 support for the DRD function

- Users in IMS 10 and IMS 11 without DRD
  - Can use the new IMSRSC repository for stored resource definitions in IMS 12
  - Can create new RDDDs for stored resource definitions in IMS 12
- Both RDDDs (system and non-system) and the IMSRSC repository can exist together during migration to the IMSRSC repository

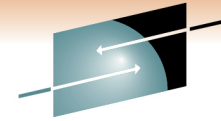


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## IMS Repository Function Benefits

- Consolidation of resource definitions in a single place, the repository
- DRD definitions are the initial implementation of the IMS repository function (to replace RDDs)
- Full support for populating, managing, storing, sharing, and retrieving a consistent set of DRD stored resource definitions for multiple-IMS IMSplexes and single-IMS IMSplexes
- Manual coordination of multiple RDDs in a multiple-IMS IMSplex eliminated, replaced by basic functioning of the IMS repository
- Improvements in IMSplex systems and resource management with the repository
- A strategic direction for IMS architecture

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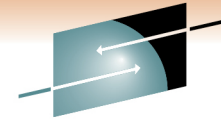
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# IMS Repository Function components

- A Repository Server (RS)
- Repositories
  - Catalog repository
  - IMSRSC repository(s)
- A Common Service Layer (CSL) IMSplex configuration consisting of
  - Operations Manager (OM)
  - Resource Manager (RM)
  - Structured Call Interface (SCI)
  - SPOC for entering type-2 commands
  - Optional resource structure with CQS address space
- Batch utilities
  - Batch ADMIN utility
  - RDDS to / from repository utilities

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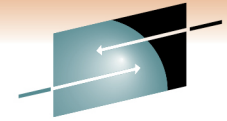


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## IMS Repository Function components ...

- A Repository Server (RS)
  - A new BPE-based address space
    - Managed by the RM CSL address space
  - Two types
    - Master Repository Server
      - *Single instance*
      - *Manages access to repository data sets*
      - *First RS address space to access repository*
    - Subordinate Repository Server
      - *One or more instances*
      - *Used if master Repository Server goes down*
      - *Optional but recommended*

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## IMS Repository Function components ...

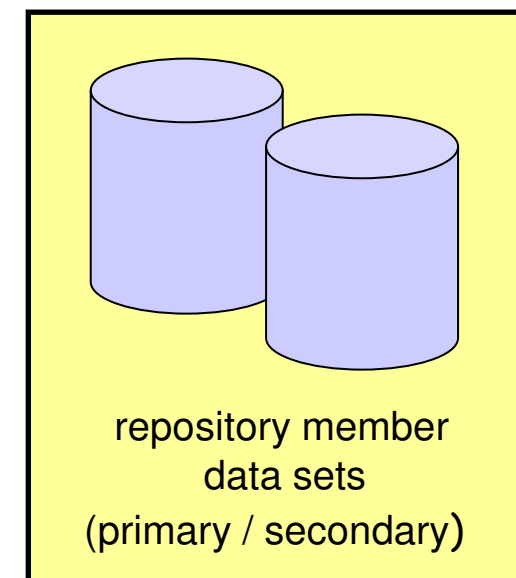
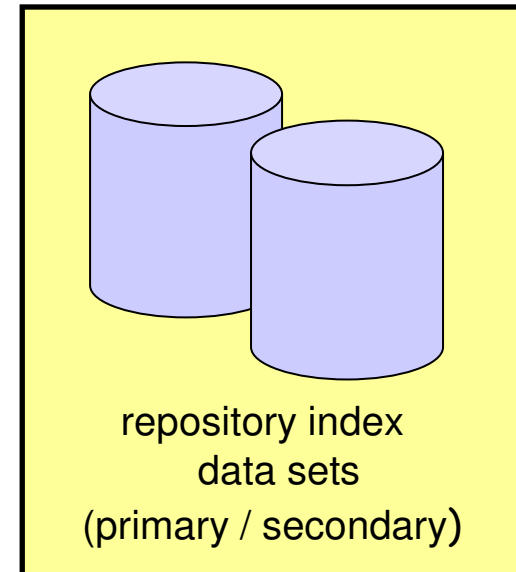
- A Repository Server (RS)
  - Uses VSAM KSDS data sets to store information
  - Can be on a separate LPAR in the parallel sysplex
  - Recommendation
    - One master Repository Server address space per IMSplex

## IMS Repository Function components ...

- A Repository Server (RS)
  - Has its own internal repository called the 'catalog repository'
  - Manages IMS repositories (IMSRSC for DRD)
  - Ensures repository data integrity
  - Uses SAF to restrict access to repositories
  - Provides an audit trail using the z/OS logger
  - Provides tracing capabilities via BPE

# IMS Repository Function components ...

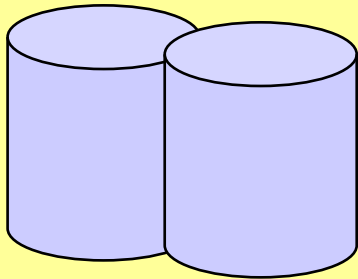
- Repository data sets
  - Multiple sets of VSAM KSDS data sets
  - Each set composed of
    - Repository index data set
    - Repository member data set
    - Each of these has a primary and secondary data set (duplexed)
      - *Optional spare set (third) can be defined*
- Two types of repository data sets
  - Catalog repository data sets
  - IMS repository data sets



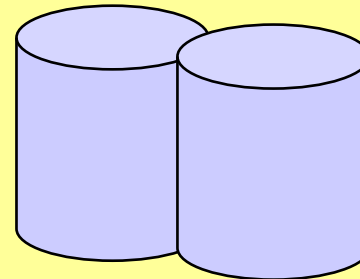
# IMS Repository Function components ...

- Catalog repository (RS catalog data sets)
  - Required per Repository Server
  - Manages the Repository Server (RS) functions
  - Manages information about IMS repository data sets
  - Composed of two pairs of data sets
    - Primary index data set and primary member data set (required)
    - Secondary index data set and secondary member data set (required)
    - No spare capability

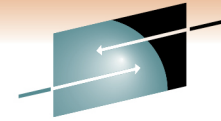
RS catalog data sets



Primary and secondary index data sets



Primary and secondary member data sets



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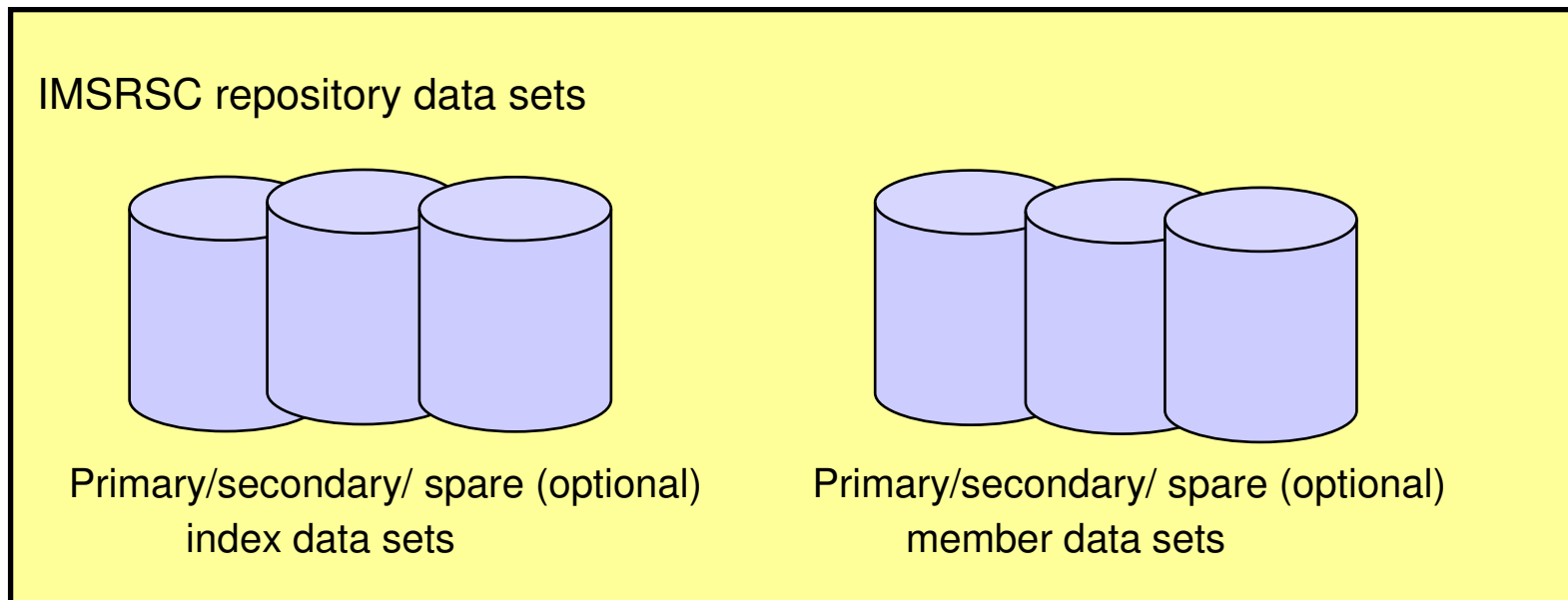
# IMS Repository Function components ...

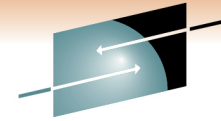
- IMS repositories
  - IMSRSC repository contains
    - Stored resource definitions for DRD resources for one or more DRD-enabled IMS systems
      - *Programs / transactions / databases / FP routing codes and descriptors*
    - Resource lists for each IMS
      - *Contains resource names and resource types that can be processed by an IMS system*
    - Changed resource lists for each IMS
      - *Contain resource changes made when an IMS is down*
  - Typically one IMSRSC repository per Repository Server (RS) per IMSplex

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# IMS Repository Function components ...

- IMS repositories
  - IMSRSC repository
    - Composed of up to three pairs of data sets
      - *Primary index data set and primary member data set (required)*
      - *Secondary index data set and secondary member data set (required)*
      - *Spare index data set and spare member data set (optional)*





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## IMS Repository Function components ...

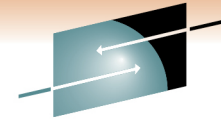
- A Common Service Layer (CSL) IMSplex configuration consisting of
  - Operations Manager (OM)
    - Used for new/modified type-2 commands for repository functions
  - Resource Manager (RM)
    - Used for managing the new Repository Server (RS) address space
    - All online access to Repository Server is through RM address space
    - New type-2 commands for managing the Repository Server
      - *UPDATE RM*
      - *QUERY RM*
    - RM is enabled to the repository by specifying a Repository Section in the RM initialization member (CSLRIxxx)

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## IMS Repository Function components ...

- A Common Service Layer (CSL) IMSplex configuration consisting of
  - Structured Call Interface (SCI)
    - Used for communications within the CSL
    - Not used for communications between RM and the RS
    - RS is not considered a CSL manager
  - Optionally, a resource structure in a Coupling Facility
    - Used for repository name and repository type consistency if present
    - Managed by a Common Queue Server (CQS) address space
    - Multiple RMs in an IMSplex require that a resource structure exists
  - SPOC (single point of control) for entering type-2 commands
- Can be a single-IMS IMSplex or a multiple-IMS IMSplex

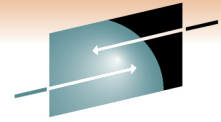


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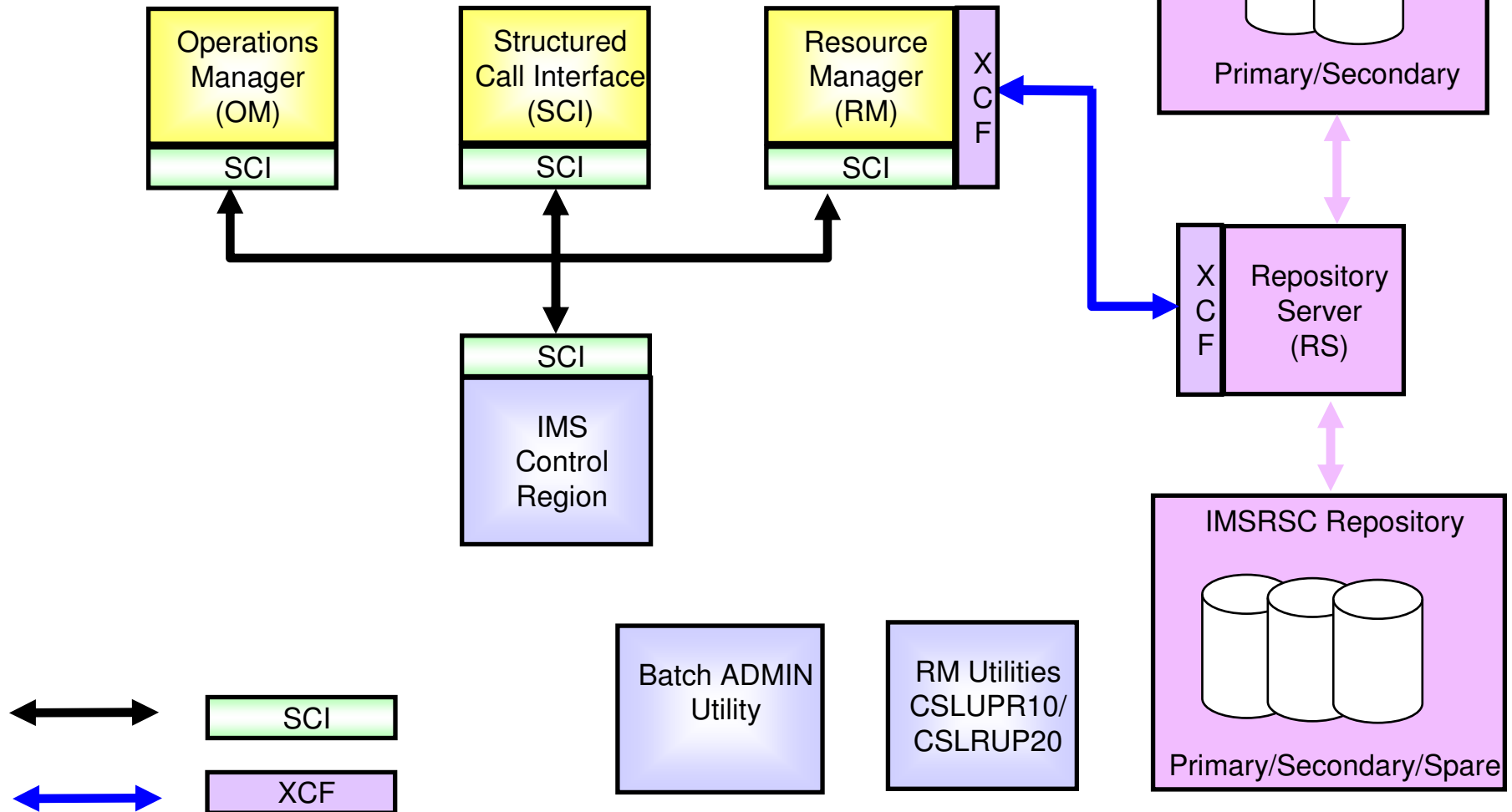
# IMS Repository Function components

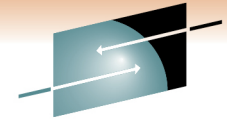
- Batch utilities
  - Batch ADMIN utility (FRPBATCH)
    - Commands for managing IMSRSC repositories
      - *Functions such as ADD a new IMSRSC repository, LIST the characteristics of an IMSRSC repository, START or STOP an IMSRSC repository*
- RDDS to / from repository utilities (Batch RM utilities)
  - RDDS to Repository Utility (CSLURP10)
    - *For migration*
  - Repository to RDDS Utility (CSLURP20)
    - *For fallback*

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# IMS Repository Function Configuration





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# IMS Repository Setup

- Repository Server setup
- Creating / enabling an IMSRSC repository for DRD

# IMS Repository Setup

- Repository Server
  - Create catalog repository data sets
  - Set up BPE configuration member
  - Set up FRPCONFG configuration member
    - Repository Server settings
    - Audit log definitions
    - Define security
  - Set up the CSL
    - RM needs new CSLRlxxx repository section
  - Set up IMS
    - DFSDFxxx needs new repository section
  - Start the master Repository Server
  - Start subordinate Repository Servers

## Enabling an IMSRSC repository for DRD

- Create IMSRSC repository data sets
- Define security for IMS repository
- Define the IMSRSC repository to the Repository Server
- Start the IMSRSC repository
- Enable the IMSRSC repository to RM and IMS
- Populate the IMSRSC repository
  - If IMS is up, populate using the EXPORT DEFN TARGET(REPO) command to add DRD stored resource definitions to the IMSRSC repository
  - If IMS is down, use the batch RDDS to Repository Utility (CSLURP10) to populate the IMSRSC repository

# IMSRSC repository is active & populated

- Begin to use type-2 DRD repository commands that access/update stored resource definitions in the repository

```
EXPORT DEFN TARGET (REPO) TYPE (ALL) NAME (*)  
  
IMPORT DEFN SOURCE (REPO) TYPE (DB) NAME (DBABC)  
OPTION (UPDATE)  
  
DELETE DEFN TARGET (REPO) TYPE (DB) NAME (DBXYZ)  
  
QUERY IMS  
  
QUERY DB/PGM/TRAN/RTC SHOW (DEFN)
```

# IMS Repository Commands

- IMS and RM IMSplex commands issued from SPOC or Manage Resource panels
- Batch ADMIN commands
- Repository Server commands issued through z/OS modify interface



# IMS and RM IMSplex Commands issued from SPOC or Manage Resources panels

- IMS type-2 commands

- UPDATE RM
- QUERY RM
- UPDATE IMS
- QUERY IMS

For management of repository and RDDS functions

For status of RM and IMS

- EXPORT DEFN TARGET (REPO)
- IMPORT DEFN SOURCE (REPO)
- DELETE DEFN

For working with DRD stored resource definitions in the repository

- QUERY  
DB/DBDESC/PGM/PGMDESC/TRAN/TRANDESC/RTC/RTCDESC  
SHOW (DEFN)

For displaying stored resource definitions in the repository and their attributes

- DRD commands (CREATE, UPDATE, DELETE) work with runtime definitions, not the stored resource definitions in the repository

# Batch ADMIN commands (FRPBATCH)

- Commands for managing repositories (IMSRSC)

- ADD
- UPDATE
- RENAME
- DELETE

Add a new repository definition, update an existing repository definition, rename an existing repository definition, remove an existing repository definition.

- DSCHANGE

Change data set disposition

- LIST

List repository information

- START
- STOP

Start or stop a repository

# Repository Server Commands Issued Through the z/OS Modify Interface

- Functions for managing a Repository Server (RS) and its repositories (IMSRSC)

- ADMIN }

Administrative functions for IMSRSC repositories –  
change data set disposition, display data sets,  
start/stop repositories

- AUDIT }

Dynamically turn auditing on or off

- SECURITY }

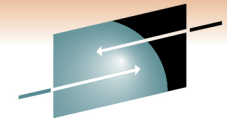
Refresh in-storage RACF profile definitions

- SHUTDOWN }

Shutdown Repository Server address space(s)

- STOP }

Stop/shutdown Repository Server

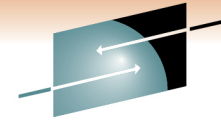


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## IMS Repository Migration Overview ...

- From DRD with RDDSDs to DRD with Repository
- From no DRD to DRD with Repository

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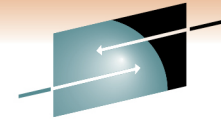
## IMS Repository Migration Overview ...

- From DRD with RDDSs to DRD with Repository
  - Create non-system RDDS that contains current definitions via EXPORT command or DRD utilities
  - Set up repository parameters in PROCLIB members FRPCONFG, BPECONFIG, CSLRIxxx, DFSDFXxx
  - Create catalog repository data sets and IMSRSC repository data sets
  - Start the Repository Server address space
  - Use the batch ADMIN utility to define the IMSRSC data sets to the Repository Server
  - Run the batch RDDS to Repository utility to populate the repository
  - Cold start IMS with AUTOIMPORT specified

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# IMS Repository Migration Overview

- From no DRD to DRD with Repository
  - First implement DRD with RDDs
    - Set up DRD parameters in DFSDFxxx
      - *MODBLKS=DYN, RDDSDSN=, AUTOIMPORT=MODBLKS*
    - Cold start IMS using updated DFSDFxxx
      - *AUTOIMPORT will use MODBLKS for definitions*
      - *Online change now disabled*
  - Follow process to migrate from DRD with RDDs to DRD with repository



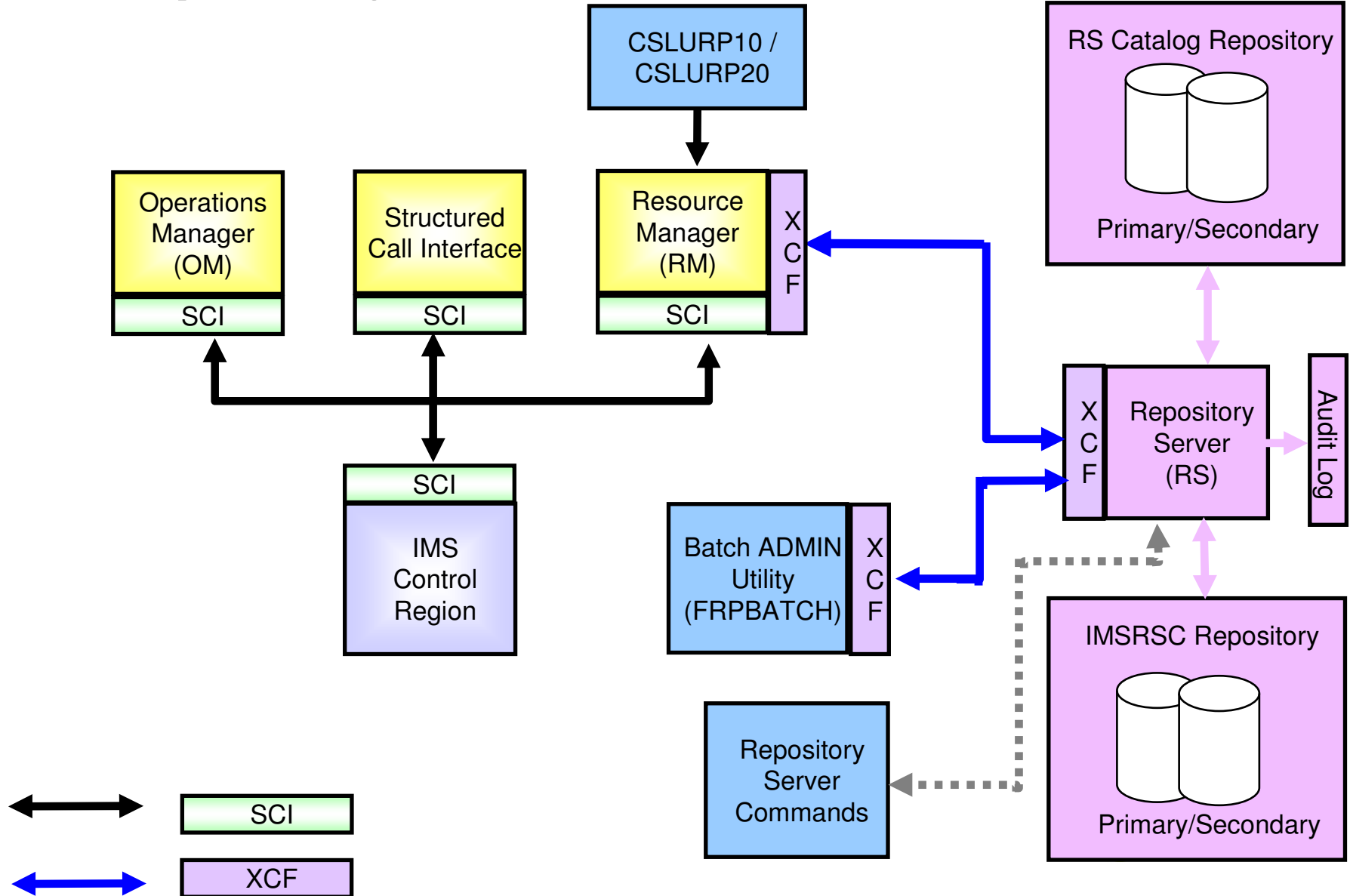
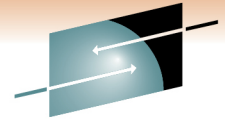
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## IMS Repository Function Benefits

- Consolidation of resource definitions in a single place, the repository
- DRD definitions are the initial implementation of the IMS repository function (to replace RDDs)
- Full support for populating, managing, storing, sharing, and retrieving a consistent set of DRD stored resource definitions for multiple-IMS IMSplexes and single-IMS IMSplexes
- Manual coordination of multiple RDDs in a multiple-IMS IMSplex eliminated, replaced by basic functioning of the IMS repository
- Improvements in IMSplex systems and resource management with the repository
- A strategic direction for IMS architecture

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# IMS Repository Function Architecture





# IMS 12 System Enhancements

- Dynamic resource definition (DRD) enhancements
- Extended address volume (EAV) enhancement
- IMS logger enhancements
- System pools storage enhancement
- Command enhancements
- Syntax checker enhancements
- CQS traceability enhancements
  
- IMS repository function