# A07 Bridging IMS Dynamic Capabilities to the IMS Strategic Vision

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# Disclaimer

# Agenda

***Introduction***

Dynamic Resource
Definitions (DRD)

Repository

Dynamic MSC

Connectivity

Other Dynamic Support

Taking advantage of the dynamic capabilities IMS can improve availability and allow you to be more agile in addressing you customer needs.

If it is using cloud style provisioning techniques or needing to quickly address scalability needs as you add more mobile channels to your IMS services, the dynamic capabilities of IMS can help you achieve your strategic goals.

# There are three important shifts fundamentally changing IT

## Data

Data is becoming the world's new natural resource

## Cloud

The emergence of cloud is transforming IT and business processes into digital services

## Engagement

Social. Mobile. Security. Empowering people with knowledge, enriching them through networks and changing expectations.

# IMS Product Strategy is aligned with these shifts

| | Strategic Intent | Investment |
|---|---|---|
| | ■ Continue to deliver the IMS Value Proposition<br>— Superior performance, reliability, availability and serviceability<br>— Minimize cost per transaction | ■ Core Capabilities<br>— Reduce path length, contention, I/O…<br>— Reduce planned outages<br>— More dynamic capabilities |
| | ■ Innovate and extend the value of your IMS investment | ■ Data & Analytics<br>— Accelerate time to insight<br>■ Cloud/Mobile<br>Rapidly enable/control cloud & mobile access to IMS resources |
| | ■ Expand and empower the IMS talent population | ■ Open interfaces & Java<br>■ Modern tooling for administrators, developers and DBAs |
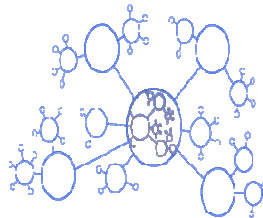
# Impact of Planned Outages

- Less Customer satisfaction
  - Can't use you service when they want

- Reduced responsiveness to changing business needs
  - Only roll out changes during periodic maintenance windows

- Loss of Money
  - Customer loss
  - Labor costs

So why not use dynamic capabilities wherever possible?



Source: Aberdeen Group, February 2012

# Some IMS Dynamic Capabilities

- Dynamic LOCKTIME

- Dynamic DB buffers

- DFSMS CA Reclaim

- Database versioning

- HALDB Alter

- DEDB Alter

- Dynamic Change of OTMA descriptors

- Dynamic IMS Connect configuration

- Dynamic Resource Definitions (DRD)

- Online Change

- Member Online Change

- Refreshable User Exits

- Dynamic Application Refresh

# Dynamic Resource Definitions

# Agenda

Introduction

**Dynamic Resource Definitions (DRD***)*

Repository

Dynamic MSC

Connectivity

Other Dynamic Support

A system program can create, modify or deleted certain system resources using Dynamic Resource Definitions without the need for Online Change or an IMS outage.

DRD can also simplify the IMS system generation process by removing the need to define MODBLK type resources as part of the stage1 system generation process.

This leads to more agility enabling you to adapt to shifting needs quicker.

# Dynamic Resource Definition (DRD)

- *Improve the availability* of the IMS online environment

- Allow user to *dynamically* define and enable *MODBLKS resource definitions*
  - *Databases*
  - *Programs*
  - *Transactions*
  - *Routing Codes*

- IMS Repository provides an optional single centralized store for resource definitions for an IMSplex
  - Across multiple IMSs or for a single standalone IMS
  - Can make changes when an IMS is down
  - Provides definitions when IMS cold start is required

- No requirement for MODBLKS data set,

- No requirement for IMS MODBLKS SYSGEN + IMS restart/online change

- Reduce STAGE1 definitions

**See Session A08**

# Modifying Resource Definitions without DRD

- To add, change, or delete MODBLKS resources in a running IMS system requires

  - MODBLKS SYSGEN

  - ACBGEN - if database (DDIR) or program (PDIR) change

  - Way to bring the new MODBLKS resources online

    - Online change

    - IMS restart

```
SYSGEN ──→ OLC
ACBGEN ──→ /NRE
```
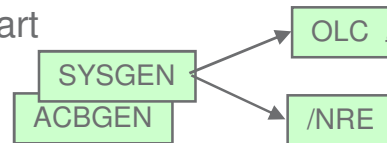
During online change processing, all activity is quiesced at some point

One resource can prevent entire process from completing

May not have available window to recycle IMS

- Process is more complex with multiple IMSs running in an IMSplex

# Modifying MODBLKS Resources without DRD

//MODBLKSx

(stored resource definitions)

During IMS restart processing, resource definitions are loaded from the active MODBLKS library (cold start) or from the IMS log (warm/emergency restart).

OLDS

COLD START

OLC

RESTART

WARM START

EMERGENCY RESTART

IMS Control Region

SYSGEN Process

After restart, these can only be added, changed, or deleted through the ONLINE CHANGE process or another RESTART (some definitions can be updated by command).

Control Blocks
DDIRs
PDIRs
SMBs
RTCEs

(runtime resource definitions)

# Inside DRD

- Type-2 commands: CREATE, DELETE, UPDATE, IMPORT, EXPORT,QUERY

- IMS Repository or  a set of *resource definition data sets* (RDDS)
  - Contains statically (SYSGEN) and dynamically created definitions
    - Resource definitions
    - Model descriptors

  - Import and export functions provided to save/restore resource definitions across a cold start

- Enhanced Type-2 command to QUERY the attributes of defined IMS resources and descriptors

# Inside DRD (cont.)

- Enhanced DFSINSX0 (Destination Creation) user exit to dynamically create program and transaction resources

- UPDATE and QUERY support for MSC resources
  - Supports resource modification without requiring system definition changes or an IMS restart

- CREATE and DELETE for MSC physical links

# Modifying MODBLKS Resources with DRD

**RDDS**

(stored resource definitions)

During IMS cold start processing, resource definitions may be IMPORTed from a Resource Definition Data Set.

Definitions can be EXPORTed to a Resource Definition Data Set.

Definitions can be *dynamically created, updated, or deleted* using new or enhanced Type-2 commands.

**OLDS**

WARM START

EMERGENCY RESTART

EXPORT

IMPORT

**IMS CONTROL REGION**

Control Blocks
DDIRs
PDIRs
SMBs
RTCEs

(runtime resource definitions)

CREATE
UPDATE
DELETE
IMPORT
EXPORT
QUERY

# DRD Environment

- DRD requires:
  - Common Service Layer with Structured Call Interface and Operations Manager (CSL with SCI/OM)
    - Resource Manager is not required

  - IMS PROCLIB members with DRD enablement parameters
    - DFSDFxxx
    - DFSCGxxx (CSL parameters - can be replaced by section of DFSDFxxx)

  - Data sets to hold resource definitions (RDDSs)
    - or IMSRSC Repository
  - Entry point for DRD commands
    - IBM Management Console for IMS, TSO Single Point Of Control (SPOC), or other OM interface

- All IMS online environments supported, including data sharing and shared queues

# Enabling DRD

- Define DRD parameters DFSDFxxx
  - set MODBLKS=DYN

- Define CSL parameters in DFSCGxxx

- Define Resource Definition Data Sets (RDDS) or implement IMS Repository
  - Populate with MODBLKS definitions using utilities

See *IMS System Definition Reference* for more detail

- Cold start IMS
  - Required to switch to/from DRD
  - If RDDS not previously populated with utilities, export MODBLKS definitions to RDDS to capture existing definitions

- Use new Type-2 commands to create, update, delete, import and export resource definitions

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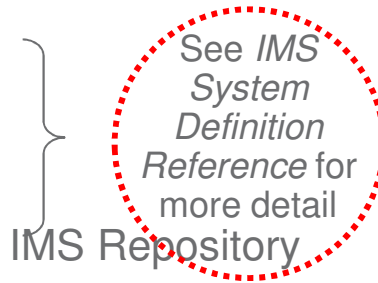
# Defining Resources in IMSPlex

z/OS 1

IMS1

CC = 0

TRANA

SCI

CREATE TRAN
NAME(TRANA)

CREATE TRAN
NAME(TRANA)

IMS1 CC = 0
IMS2 CC = 0
IMS3 CC = 0

SCI

z/OS 2

CC = 0

SCI

IMS2

CC = 0

TRANA

SCI

z/OS 3

CC = 0

IMS3

TRANA
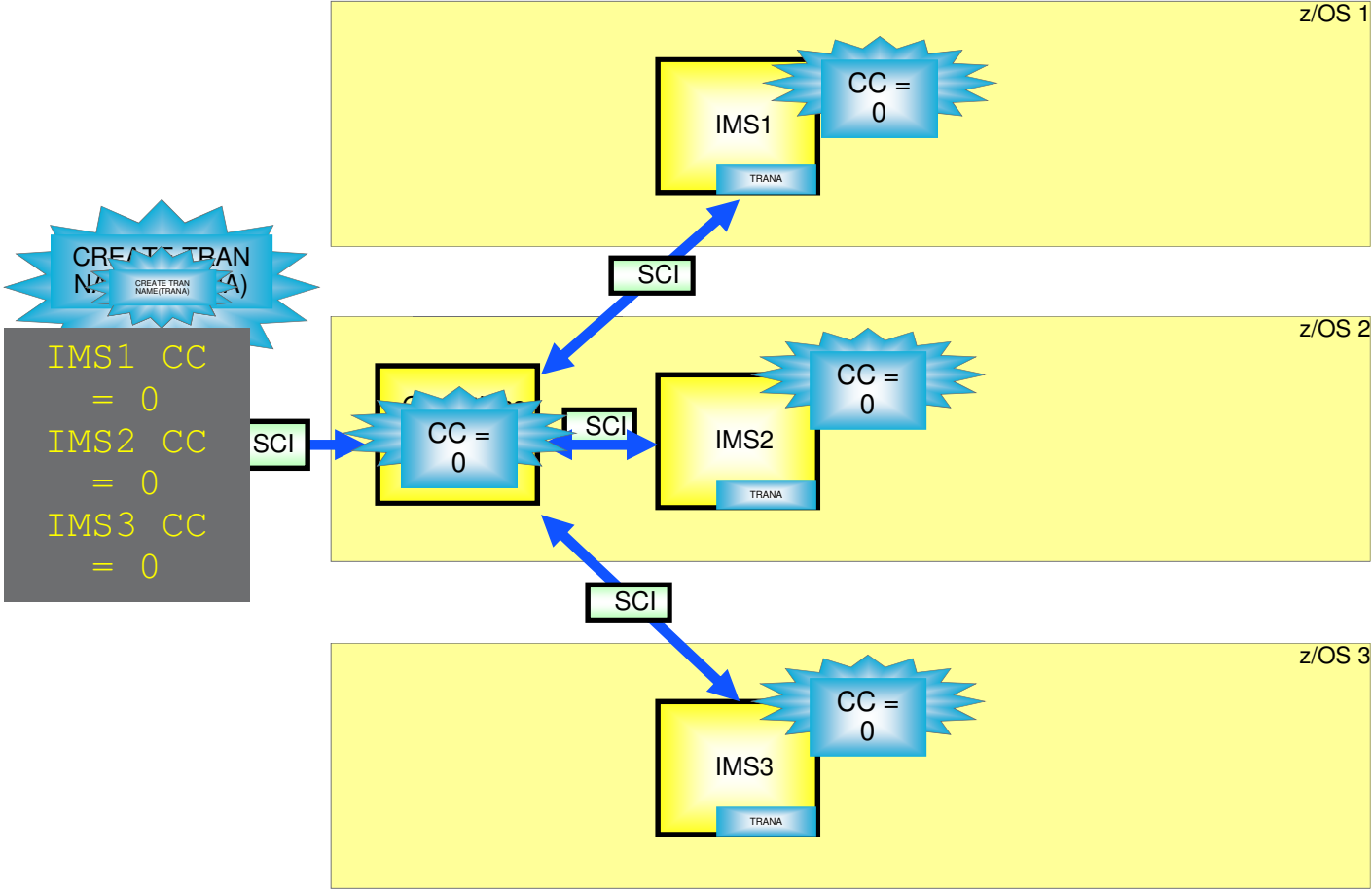
# Displaying Resource Attributes and/or Status

- Use the type-2 QUERY command to:

    - Display the attribute values of a resource/descriptor

    - Display resource status

    - Determine whether any current "work in progress" exists that would prevent a resource
      from being updated or deleted successfully

# Descriptors

- A descriptor is a model for defining (creating) a resource or another descriptor
  - Establishes *defaults* for attributes not set in the CREATE command

- IMS-defined descriptors provided with the IMS product:
  - DFSDSDB1 (database)
  - DFSDSPG1 (program)
  - DFSDSTR1 (transaction)
  - DBFDSRT1 (routing code)

- User-defined descriptors
  - Created or updated by the user

- Current system default descriptor
  - Each resource type will have one *default descriptor* (IMS-defined or user-defined with DEFAULT(Y))

# Use Cases

- Use EXPORT/IMPORT to migrate an application defined on one IMS system to another IMS system
    - Issue EXPORT command on IMSA to export an application's database, program, routing code and transaction definitions
    - Issue IMPORT command on IMSB to import the definitions

- Use EXPORT/IMPORT to clone IMS systems
    - EXPORT definitions from IMSA
    - Coldstart new IMSB with no resources defined
    - IMPORT definitions to IMSB

- Use LIKE and descriptors to create similar resources
    - CREATE TRAN NAME(TRAN1, TRAN2, …) LIKE(TDESC1)

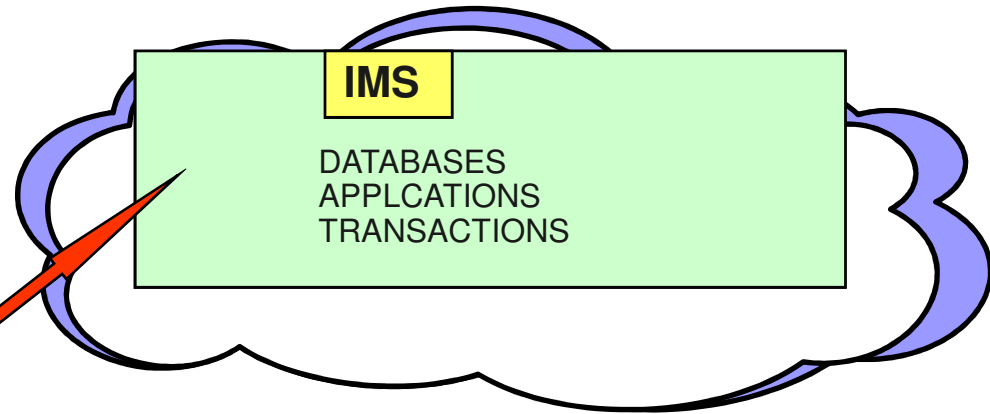- Use Batch SPOC to submit several commands

# Dynamic Definition of IMS Resources

**Five Essential Cloud Characteristics:**

   1.    On-demand self-service
   2.    Broad network access
   3.    Location independent resource pooling
✓  **4.   Rapid elasticity**
   5.    Measured Service

**IMS**

DATABASES
APPLCATIONS
TRANSACTIONS

CREATE
UPDATE
DELETE
QUERY

# IMS Repository

# Agenda

Introduction

Dynamic Resource
Definitions (DRD)

*Repository*

Dynamic MSC

Connectivity

Other Dynamic Support

The IMS repository provides a common repository that can simplify the process of defining and/or sharing system resources.

This can improving confidence in the rollout of dynamic changes

# IMS Repository Function

- Introduced in IMS 12

- 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

- IMS 14 Enhancements

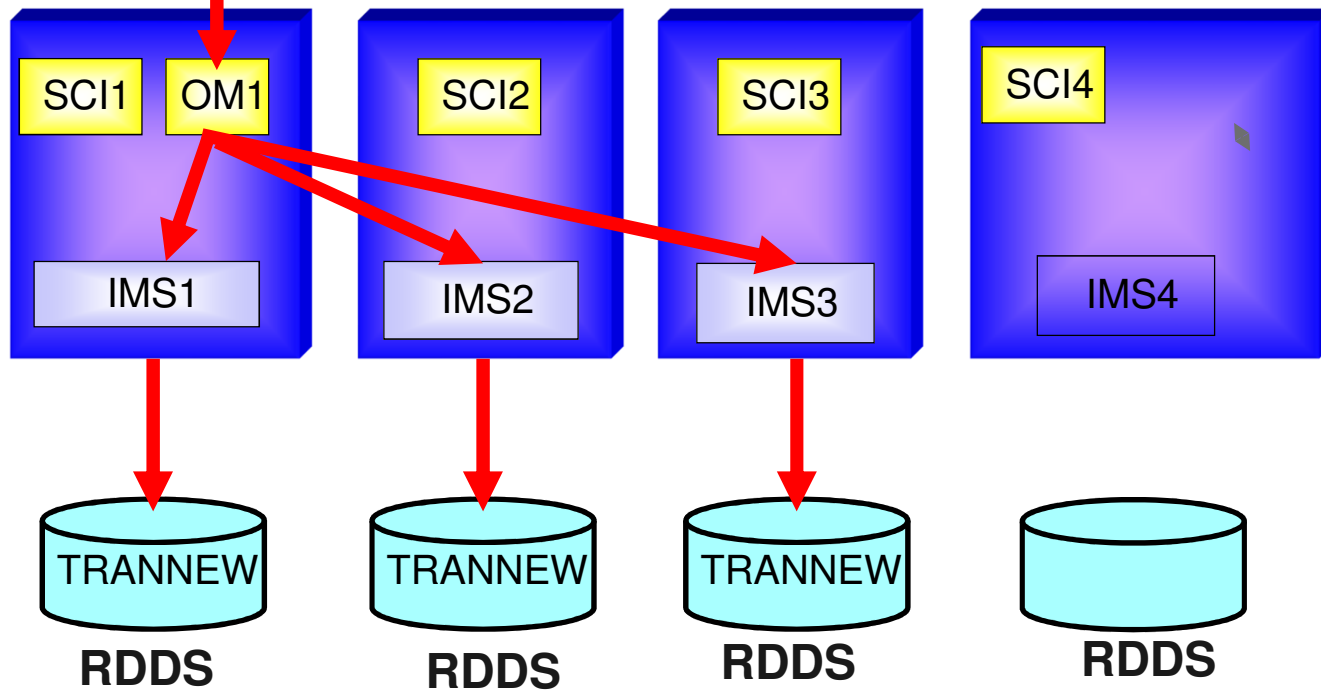# IMS V12 DRD Resources and RDDS

CREATE
TRAN (TRANNEW)

IMS4 unaware of new tran
Requires extra steps to update IMS4 RDDS

| SCI1 | OM1 | | SCI2 | | SCI3 | | SCI4 |

IMS1

IMS2

IMS3

IMS4

TRANNEW
**RDDS**

TRANNEW
**RDDS**

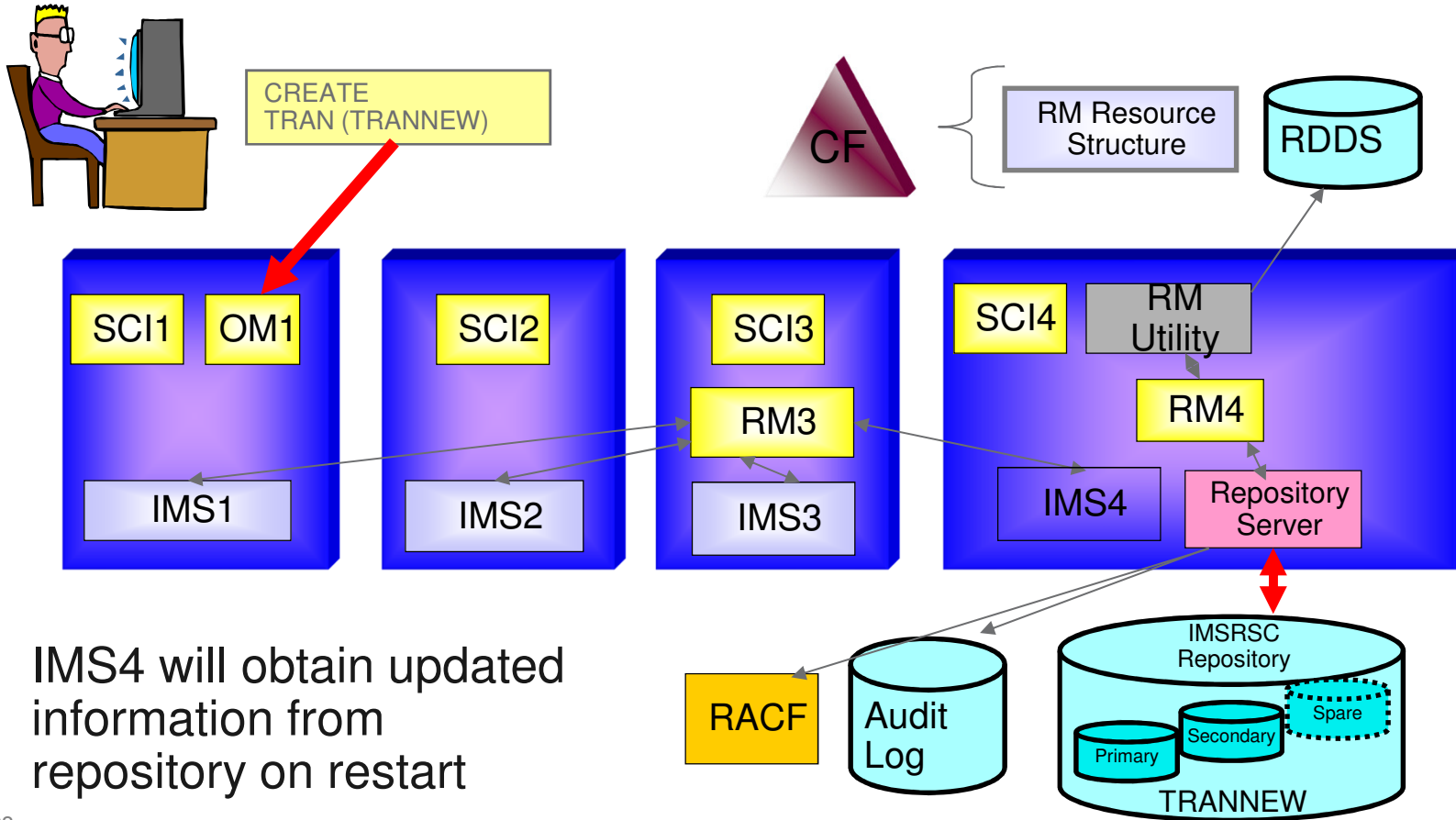TRANNEW
**RDDS**

**RDDS**

# IMS Repository Function Environment

- Repository data sets used to store resource information

- Repository Server to manage resource information

- CSL components are required (SCI, OM, RM)
  - RM resource structure is optional

- Batch Administration capability

- Audit Log capability

- Can coexist with RDDSs for migration purposes

# IMS V12 Repository for DRD Resources

CREATE
TRAN (TRANNEW)

CF

RM Resource
Structure

RDDS

SCI1  OM1

SCI2

SCI3

SCI4  RM
Utility

RM3

RM4

IMS1

IMS2

IMS3

IMS4

Repository
Server

IMS4 will obtain updated
information from
repository on restart

RACF

Audit
Log

IMSRSC
Repository

Primary  Secondary  Spare

TRANNEW

# 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 RDDSs)

- 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 RDDSs 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

# Dynamic MSC

# Agenda

Introduction

Dynamic Resource
Definitions (DRD)

Repository

*Dynamic MSC*

Connectivity

Other Dynamic Support

A system programmer can dynamically update MSC resources without the
need for and outage or OLC.

IMS 14 adds even more dynamic capabilities

# MSC Considerations

- Static MSC definitions require an outage to change

- Can manage aspects of network dynamically – with planning

- Define dummy "spare" links in your sysgen
  - Can dynamically add logical sessions and create connections as needed to an IMS

- Dynamically modify and activate dummy definitions
  - UPDATE MSPLINK, MSLINK, MSNAME
  - Allows you to change most MSC configuration characteristics

- *Ability to dynamically create and delete MSC resources through enhancements to the IMS type-2 commands.*
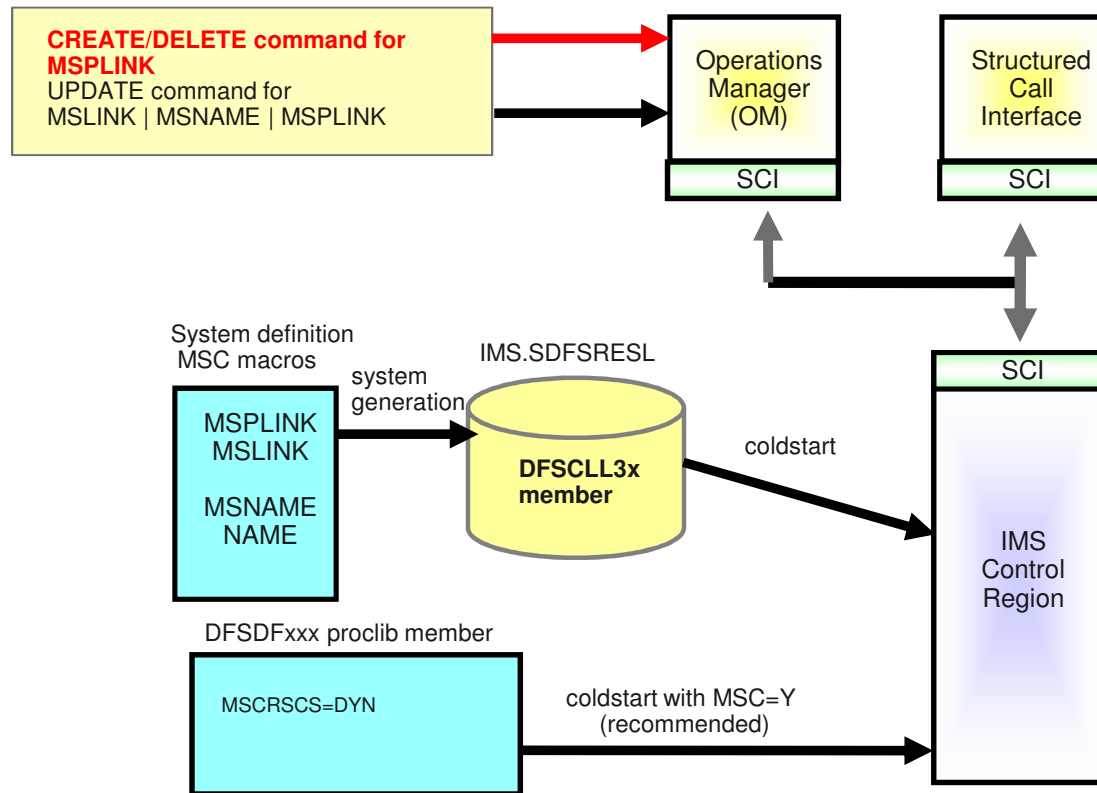
IMS 14

# Implementation considerations for Dynamic MSC

- Requires implementation of the CSL (Common Service Layer)
  - SCI, OM
    - IMS Type-2 commands are used to manage the environment

- Shared queues
  - If any IMS system in a shared queues group uses MSC, MSC must be enabled in all IMS systems, even if they do not use MSC

- DFSDFxxx: <SECTION MSC>
  - MSCRSCS=DYN|NODYN

# Dynamic MSC Environment With SYSGEN

CREATE/DELETE command for MSPLINK
UPDATE command for
MSLINK | MSNAME | MSPLINK

Operations Manager (OM)

SCI

Structured Call Interface

SCI

System definition MSC macros

MSPLINK
MSLINK

MSNAME
NAME

system generation

IMS.SDFSRESL

DFSCLL3x member

coldstart

SCI

IMS Control Region

DFSDFxxx proclib member

MSCRSCS=DYN

coldstart with MSC=Y (recommended)

# Connectivity

# Agenda

Introduction

Dynamic Resource
Definitions (DRD)

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Dynamic MSC

*Connectivity*

Other Dynamic Support

A system program can make many changes to the IMS connect configuration without the need of an IMS Connect outage

A system program can make many changes to the OTMA configuration without the need of an IMS outage

As you expand the external use of IMS services or add access to external services to your IMS applications, being able to quickly make the needed configuration changes without affecting existing access is essential.

# OTMA – Dynamic Change of Descriptors

- **Dynamically modify** and query OTMA descriptors
  - Affect destination routing decisionsType-2 Commands
    - CREATE | UPDATE | DELETE | QUERY OTMADESC

- Changes to descriptors
  - Persistent across warm and emergency restarts
    - Internal table of destination routing descriptors is automatically rebuilt using checkpoint and log records
  - Cold starts
    - DFSYDTxx member has to be manually updated with changes

- Availability of IMS when adding, updating, or deleting descriptors
  - Provides the ability to workload-balance outbound transactions **without restarting the IMS.**
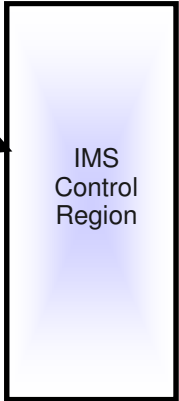
# Non-dynamic OTMA Descriptor Change

**1. Update OTMA Descriptor in DFSYDTx Member**

```
D OTMACL99 TYPE=IMSCON
        TMEMBER=HWS1
        TPIPE=HWS1TP01
```
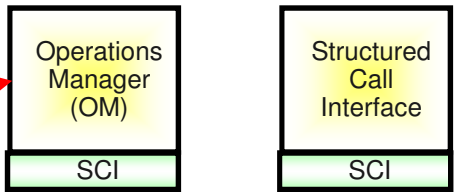
IMS
Cont

/CHE FREEZE

**2. Restart**

IMS
Control
Region

# Dynamic OTMA Descriptor Change

**1. Issue type-2 CREATE OTMADESC command**

CREATE OTMADESC ...

Operations Manager (OM)

SCI

Structured Call Interface

SCI

SCI

DFSYDTx Member OTMA Descriptor

D OTMACL99 TYPE=IMSCON
TMEMBER=HWS1
TPIPE=HWS1TP01

*During Cold start*

IMS Control Region
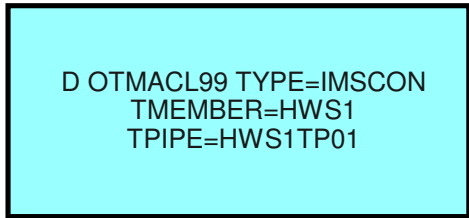
**2. Update OTMA Descriptor in DFSYDTx Member in case IMS requires cold start**
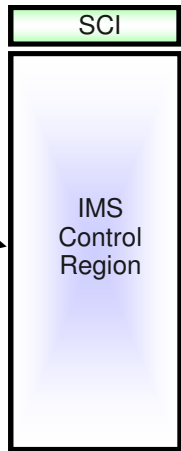
# IMS Connect Dynamic Changes

- **Dynamically create** IMS Connect resources through commands
  - For PORT and DATASTORE
  - *IMS 14 Delete support for PORT and DATASTORE*
  - *IMS 14 Create and Delete support for IMSPLEX*

  **IMS 14**

- Automatically refresh cached userids by listening to RACF events (ENF signals)

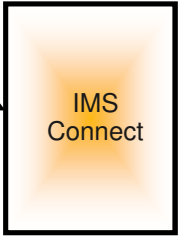- Provides higher availability **by not needing to restart** IMS Connect to make definition changes.

# Non dynamic IMS Connect Change

**1. Update Datastore definition in HWSCFGxx member**

```
DATASTORE=
 (APPL=APPL1,
  ID=IMS1,…
```

Stop IMSCON
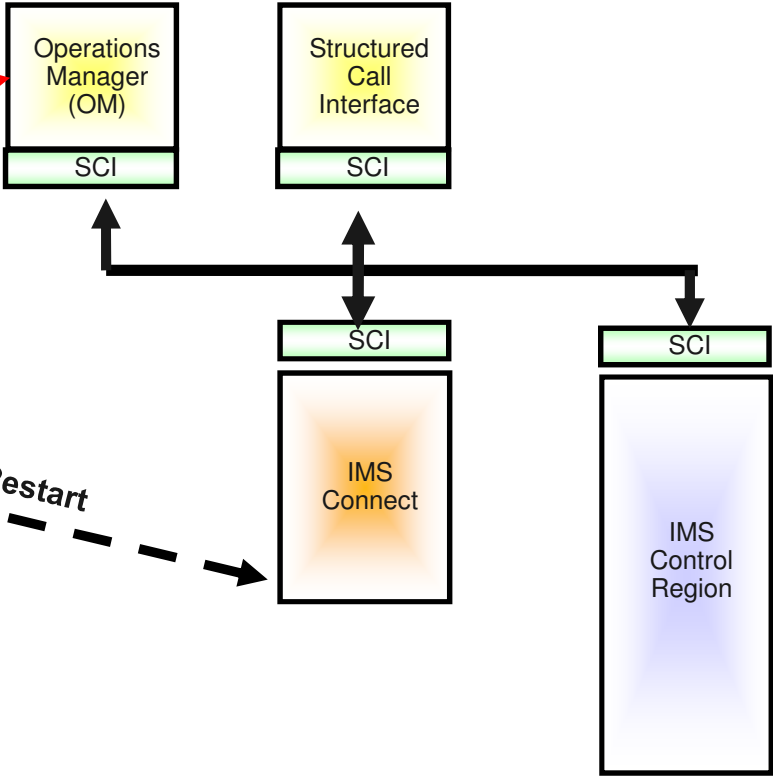/STOP IMSCON

**2. Restart IMS Connect**

IMS Connect

IMS Control Region

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# Dynamic IMS Connect Datastore Change

**1. Issue type-2 CREATE command**

**CREATE IMSCON TYPE(DATASTORE) NAME(IMS1) SET(APPL(APPL1), …**

| Operations Manager (OM) | Structured Call Interface |
|---|---|
| SCI | SCI |

| SCI | SCI |
|---|---|
| IMS Connect | IMS Control Region |

HWSCFGxx Member

```
DATASTORE=
 (APPL=APPL1,
  ID=IMS1,…
```

*For Connect Restart*

**2. Update DATASTORE definition in HWSCFGxx member for IMS Connect restarts**

# Other Dynamic Support

# Agenda

Introduction

**Dynamic Resource
Definitions (DRD)**

Repository

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Connectivity

**_Other Dynamic Support_**

A system programmer can refresh several IMS user exits without the need of an IMS outage

A system programmer can rollout a new version of an application without the need to stop P(WFI) regions.

# Refreshable User Exits

- Refresh user exits **without an IMS system outage**
  - REFRESH USEREXIT command

- IMS 13 added following exit *"types"* to support a list of exit names
  - AOIE            Type-2 Automated Operator User Exit     **IMS 14**
  - *BSEX*           *Build Security Environment Exit (DFSBSEX0)*
  - ICQSEVNT     IMS CQS Event user exit
  - ICQSSTEV     IMS CQS Structure Event user exit
  - IMSMON        IMS Monitor User Exit     **IMS 14**
  - INITTERM      Initialization/Termination user exit
  - *LOGEDIT*      *Log Edit Exit (DFSFLGE0)*
  - *LOGWRT*      *Log Write Exit (DFSFLGX0)*
  - *NDMX*          *Non-Discardable Message Exit (DFSNDMX0)*
  - PPUE            Partner Product user exit (DFSPPUE0)
  - *OTMAIOED*    *OTMA Input/Output Edit Exit (DFSYIOE0)*
  - *OTMARTUX*    *OTMA Resume Tpipe Security Exit (DFSYRTUX)*
  - *OTMAYPRX*    *OTMA Destination Resolution Exit (DFSYPRX0)*
  - *RASE*           *Resource Access Security Exit (DFSRAS00)*
  - RESTART       Restart user exit

- Benefits
  - Improves availability
  - Simplifies user exit management

# IMS 14 Dynamic Refresh of (P)WFI Regions

IMS 14

- Today, when necessary to load a changed application program already scheduled and waiting for work in (P)WFI regions …
  - The (P)WFI regions must be manually stopped in order to reload the application program
  - It can be difficult to find all the regions to stop
  - It is time consuming to restart each affected region

- Introduce a new START(REFRESH) filter for the UPDATE PGM command enabling dynamic refresh for all instances of specified application program(s) running in (P)WFI dependent regions
  - Reduces operational considerations for implementing a changed program
  - Dependent regions are not terminated, therefore remain available to process other work
  - Refreshed program gets rescheduled when a new work is available

# Summary

IMS has many enhancements to make IMS easier to use and manage dynamically

New functions built on strategic IMS components including
- Dynamic Resource Definition
- Dynamic connectivity configuration
- Refreshable user exits/application regions
- Even more to enable dynamic DB changes

These allow you to quickly adjust to changing needs so that you can move forward and stay ahead of the competition

# Thank You!