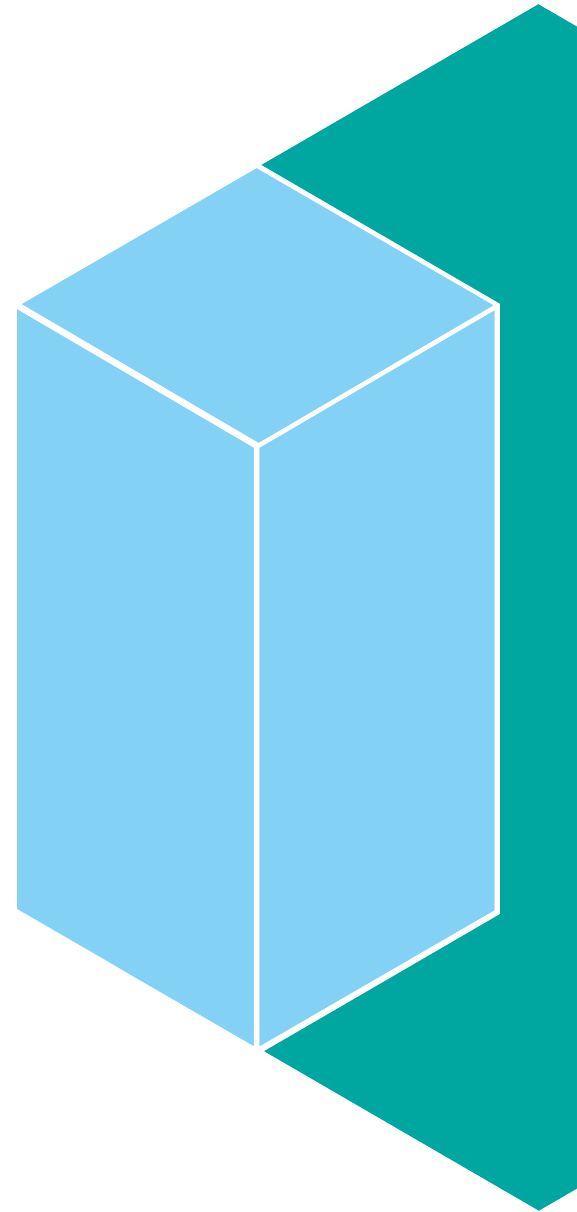


C07 - When It Comes to High Availability, How Do You Know Your System Makes the Grade?

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Sharpen your competitive edge
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Agenda



■ *Introduction*

- Story 1: Adapting to ever growing business
- Story 2: Adapting to mobile access
- Story 3: Deploying DB and application enhancements
- Taking advantage of the dynamic capabilities IMS can improve availability and allow you to be more agile in addressing your 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.



Quick Links

■ System

- [Shared Message Queues](#)
- [Common Service Layer](#)
- [Dynamic Resource Definitions \(DRD\)](#)
- [Repository](#)
- [Dynamic MSC](#)
- [Application Management](#)

■ Connectivity

- [IMS Connect](#)
- [OTMA](#)

■ Multi-Site Availability

- [IMS Replication](#)
- [GDPS Active/Active Site](#)

■ General Database

- [N-way Data sharing](#)
- [DB Quiesce](#)
- [DB Versioning](#)
- [DDL/Load from Catalog](#)
- [ACBLIB management](#)
- [IMS Tools](#)

■ FF Database

- [HALDB ALTER](#)
- [Dynamic Buffer Pools](#)
- [CA Reclaim](#)

■ Fast Path

- [DEDB Alter](#)
- [FP 64-Bit buffer](#)
- [SDEP Management](#)

How Much Interruption can your Business Tolerate?

Ensuring Business Continuity:

- Disaster Recovery – **Restore business after an unplanned outage**
- High-Availability – **Meet Service Availability objectives e.g., 99.9% availability or 8.8 hours of down-time a year**
- Continuous Availability – **No downtime (planned or not)**

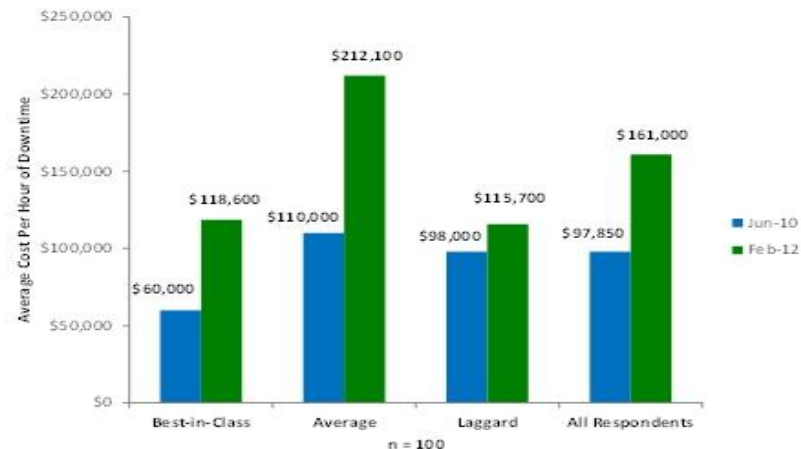
Standby



Active/Active

Global Enterprises that operate across time-zones no longer have any 'off-hours' window. Continuous Availability is required.

What is the cost of 1 hour of downtime during core business hours?



Source: Aberdeen Group, February 2012

Business Continuity

- The Top Causes of Business Interruption:
 - Planned Maintenance
 - System and Software Upgrades or Reconfiguration
 - Database Administration
 - Component Failure
 - Caused by Operator Errors, Software defects, Disk Failure, Subsystems, Hardware, Power Grid
 - Data is recoverable
 - But, changes might be stranded until component is restored
 - Disaster
 - Flood, Earthquake, Fire, Hurricane, ..., Loss of a site
 - Data is not recoverable

Establishing the Objectives:

- | | |
|---|---|
| ■ <i>Recovery Time</i> Objective (RTO) | = How much time is needed to restore business operations? |
| ■ <i>Recovery Point</i> Objective (RPO) | = How much data could we afford to <i>lose</i> ? |

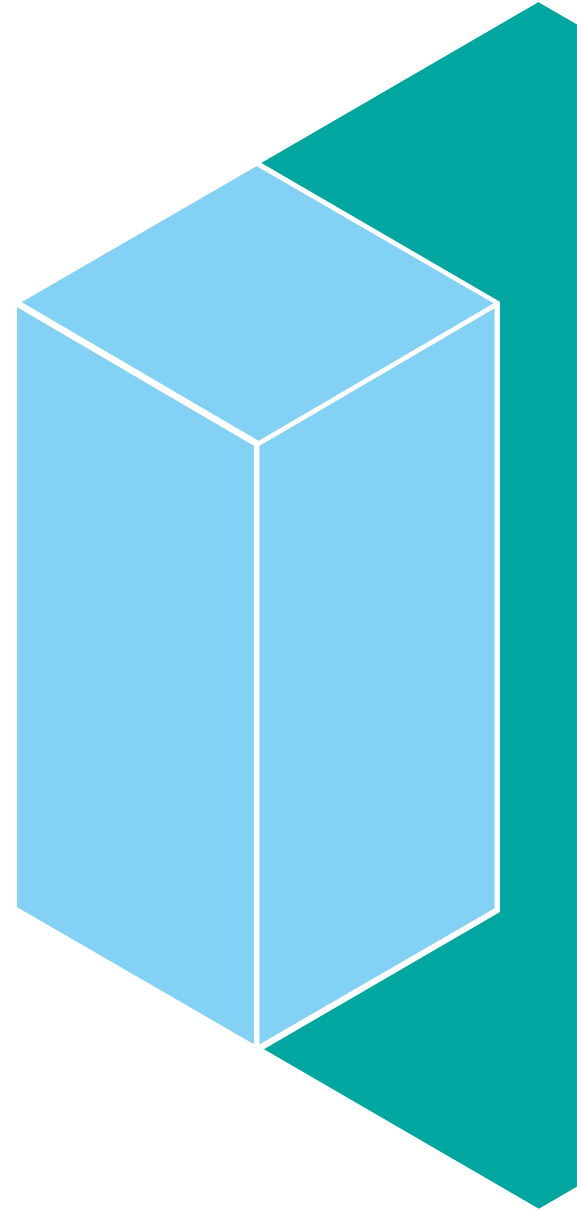
Considerations

- Redundancy
 - Spare components - Avoid Single Points of Failure
- Isolation
 - Minimize disturbances from other systems
- Concurrency
 - Perform maintenance and support concurrently with ongoing operations
- Automation
 - Automate operations as much as possible
- Scope
 - Determine availability needs for single IMS, Sysplex and/or multiple sites

Strategic Solutions for a Strategic Enterprise

- Cloud
 - Ability to quickly deploy new services
 - Ability to allow on premise provisioning of IMS resources w/o an outage
- Analytics
 - Adding quickly and easily re-deploy applications after adding analytics
- Mobile
 - Scale due to increase loads
 - Enhance information
 - Maintain availability for 24x7 access
- Bottom line is you want to be able to be able to deploy strategic initiatives in IMS without impacting your existing availability

Story 1 – Managing growing business needs

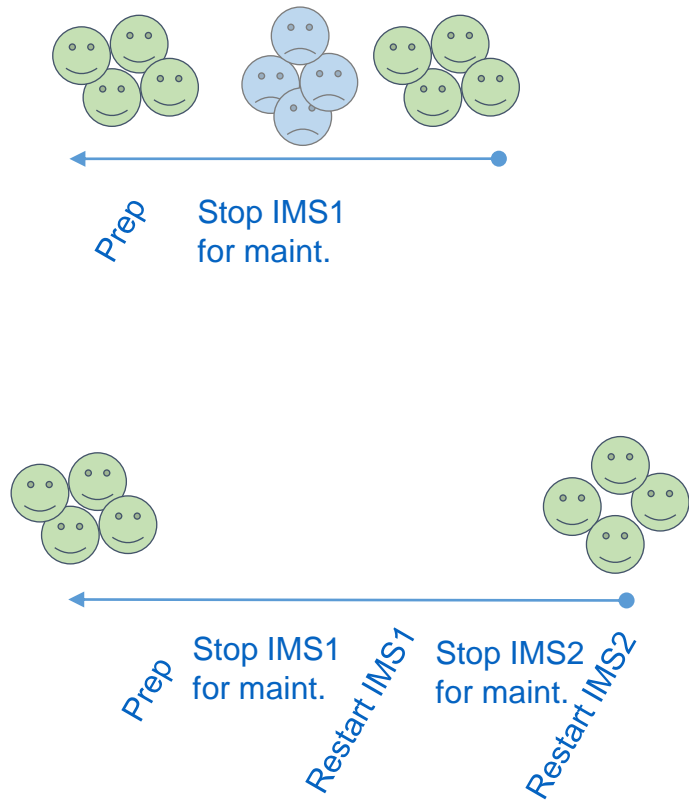


An expanding system. How to deal with an ever growing system

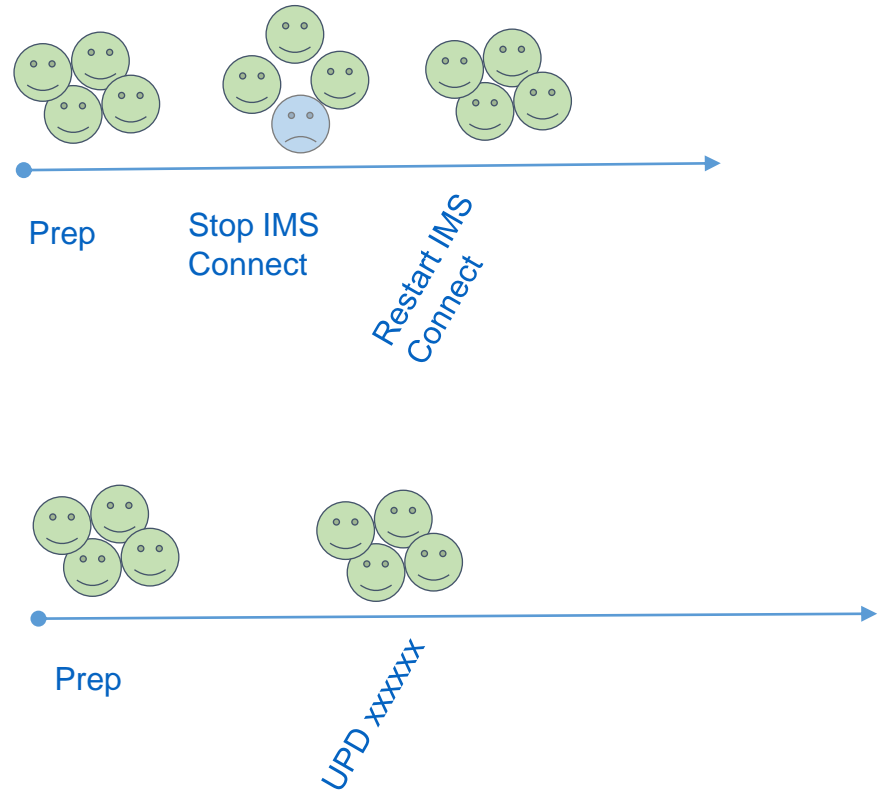
- *As your business grows so must you IT infrastructure. Whether it is organic growth or through mergers with other companies, your IMS systems needs and availability needs continue to grow to handle increased transaction and data volumes. This journey shows how some IMS capabilities listed can help you grow from a basic single IMS to a continuously growing IMSplex with little to no impact to you end users.*
 - [N-way data sharing](#) – Expanding your IMSplex to provide more capacity and eliminate certain planned outages
 - [Shared Queues](#) – Expanding your IMSplex to provide more capacity and eliminate certain planned outages
 - [Common Service Layer \(CSL\)](#) – Simplifies the management of your IMSplex
 - [IMS Connect](#) – Dynamic capabilities allow you to manage your connectivity to your IMSplex as to address changing needs.
 - [Dynamic MSC](#) – Can allow you to dynamically setup inter-IMS connectivity which could be used to aide in the merging of acquired systems
 - [FP 64-bit Buffer](#) – Automatic FP buffer pool expansion to address increase volumes
 - [SDEP management](#) – Automatically manage the SDEP portion of a DEDB area when systems are not quite balanced to prevent unexpected out of space conditions
 - [FF dynamic buffering](#) – Dynamically alter FF buffer pool to address increase volumes
 - [CA Reclaim](#) – Automatically reclaim empty VSAM CA which can reduce the need for reorganization of FF VSAMDBs to reclaim freespace.

Sample – Exposing end user Impact

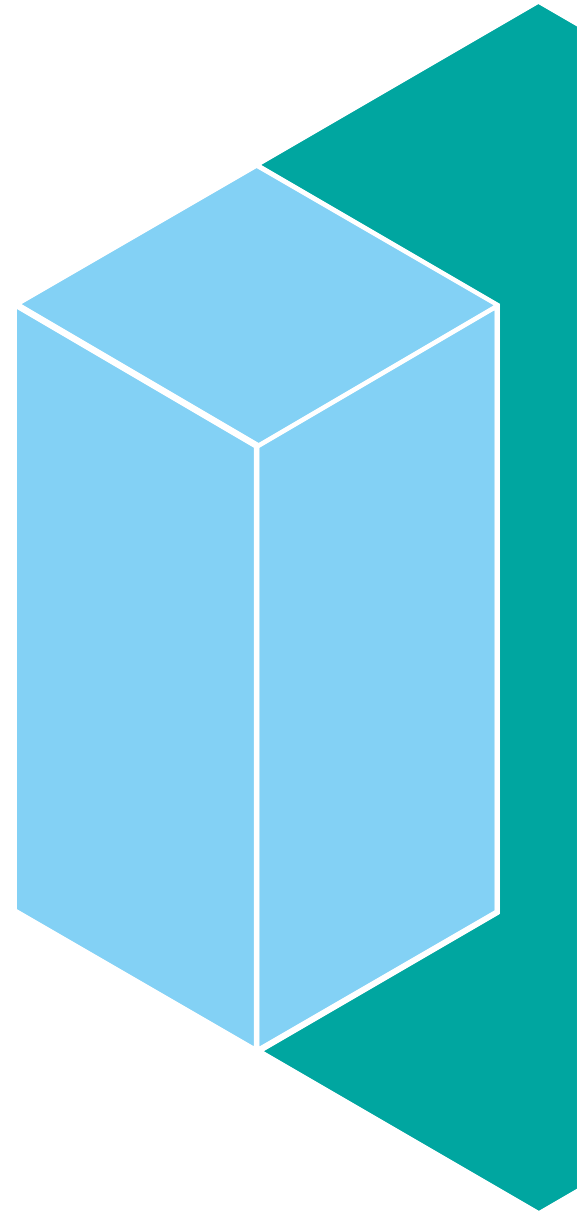
Impact of maintenance Single vs n-way



Impact of adding datastore Using dynamic commands or not



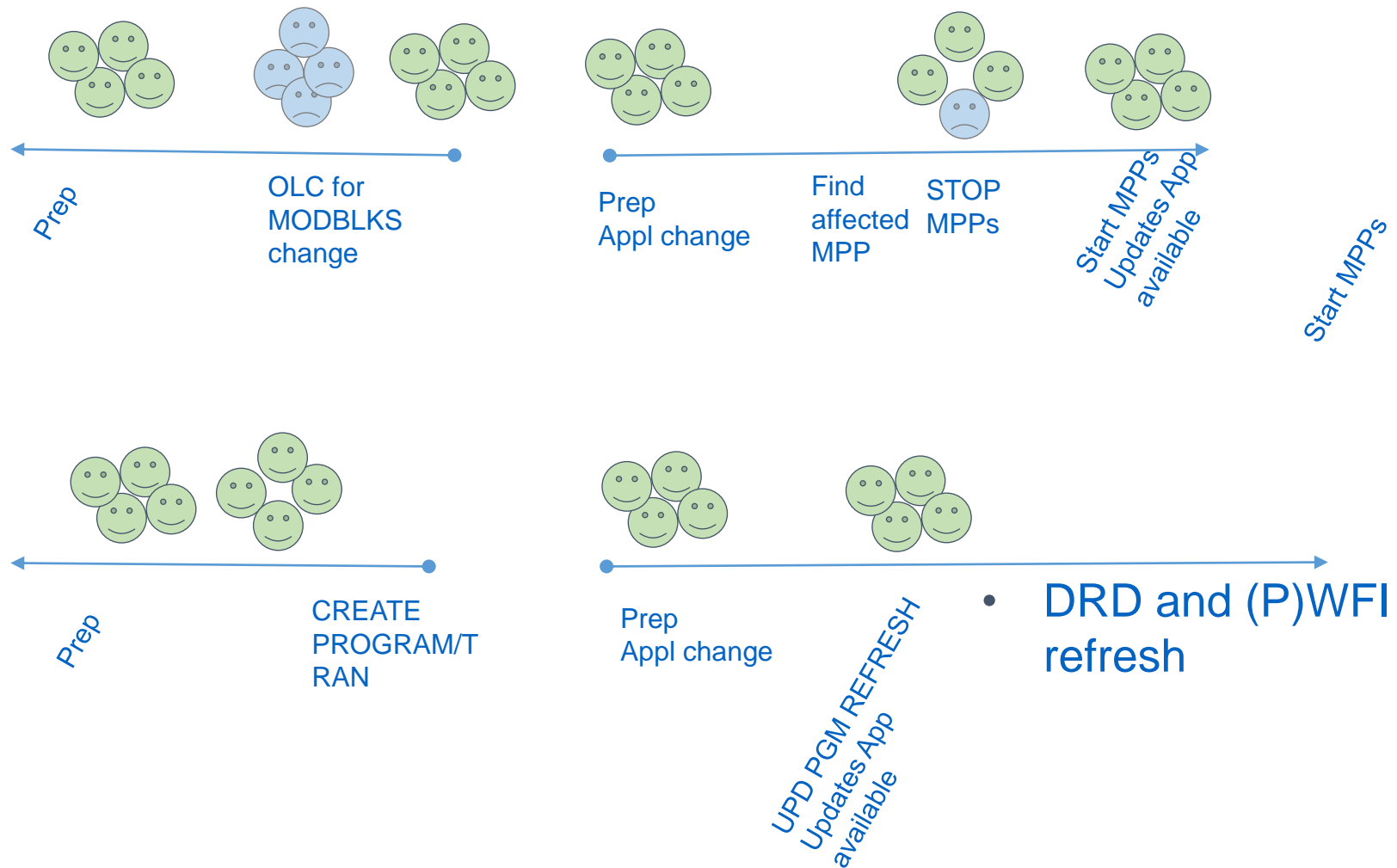
Story 2 – Expanding your Mobile Presence



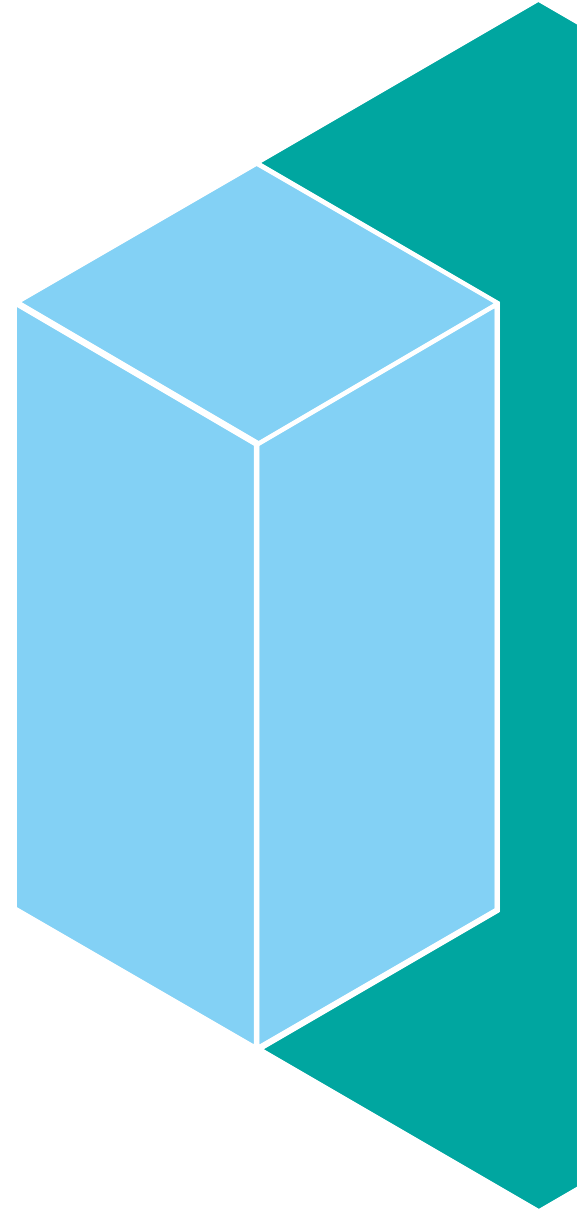
Exposing new services and managing mobile growth

- *Mobile devices are continuing to play a major role in our lives. To compete you must have a mobile presence. This journey shows how you can manage the changing IMS needs that can result from establishing this mobile presence using some of the listed capabilities.*
 - [DRD](#) – Allows you to dynamically define new transactions and applications to your IMS systems that you might want to be specific to your mobile applications.
 - [Repository](#)
 - [Application management](#) – As your mobile usage changes, there may be changes you need in your applications. IMS can allow these enhanced applications to be rolled out with an
 - [OTMA](#) – Allows to dynamically add new destinations for services to be used by application callout processing
 - [IMS Connect](#) – Allows for dynamically addressing the TCP/IP connectivity to your IMSplex
 - [Multi-site availability](#) – Allows you to use remote site as target of mobile queries to offload production volume

Sample – Exposing end user Impact of creating mobile app and deploying new version.



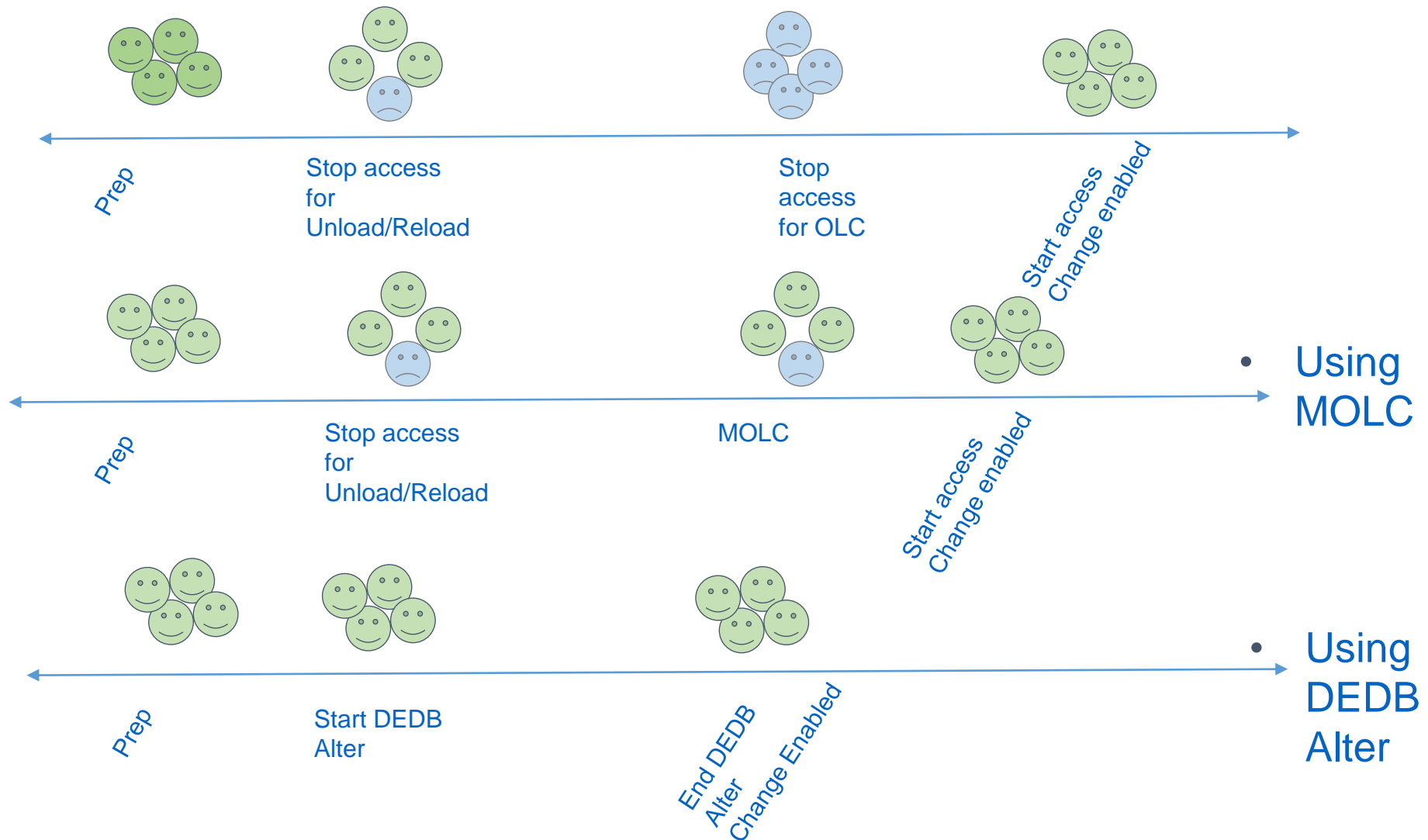
Story 3 – Deploying DB and application enhancements



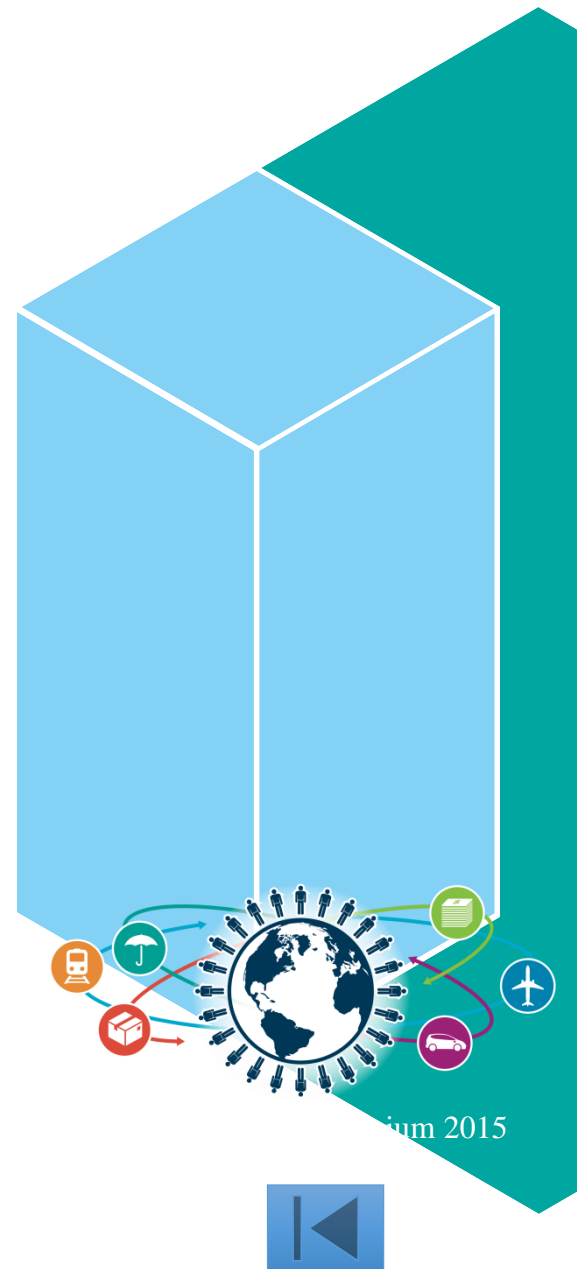
Making it easier for an AD to deploy application enhancements to make available as a service

- *As your business needs change, allowing your application programmers the ability to deploy needed data changes without impacting availability is imperative. This journey shows how the listed IMS capabilities can enable these changes without outages.*
 - [HALDB alter](#) - Allows dynamic addition of information to your HALDB.
 - [DEDB Alter](#) – Allows you to adjust to data growth by allowing you to dynamically resize your FP Areas.
 - [DB Versioning](#) – Allow you to quickly deploy DB changes w/o impacting existing applications.
 - [Member OLC](#) – Minimize impact to end users when deploying DB changes
 - [DDL/Load from Catalog](#) – Minimizes and/or eliminates impact for certain changes
 - [IMS Tools](#) – For changes that IMS does not support dynamically, some tools do with a minimal outage.
 - [Multi-site availability](#) - Certain DB structure changes can be done with only a small quiesce and no outage
 - [Applications management](#) - Dynamic refresh of WFI/PWFI applications allows for the deployment of updated applications w/o impact.

Sample - End user Impact of a DB change



Shared Message Queues

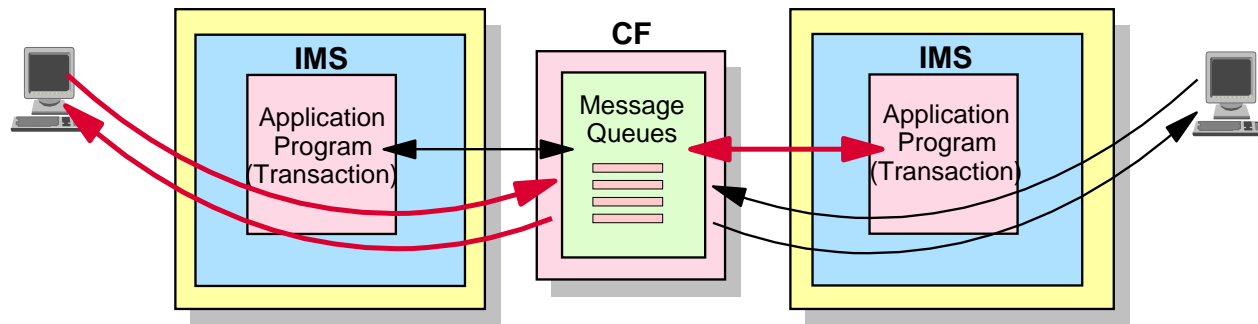


IMS Message Queue

- Adjust number of queue buffers to prevent QBUF waits
- Size queue buffers according to majority of queue activity
- Watch over the Message Queues
 - Runaway or looping ISRTs
 - High input message arrival rates
- SEGNO on transaction definition can limit number of segments
- DFSQSPC0/DFSQSSP0 user exits can be used to control queuing
- Tools such as Queue Control Facility are useful to offload messages

Shared Message Queues

- Shared Message Queues
 - Message queues moved to coupling facility list structures
- Single set of queues
 - Multiple IMS systems share one set of queues
 - IMS systems place messages in common queues
 - IMS systems retrieve messages from common queues
 - Any IMS can process messages on the queues
 - Is not dependent on where end user is logged on



IMS Shared Queues

- A set of input and output message queues that can be shared by multiple IMSs in a parallel sysplex
- IMS messages are placed into shared queues structures in the Coupling Facility
 - Previously each IMS had its own queues for both input and output messages and/or its own expedited message handler for Fast Path messages
- Messages in the shared queues structures are available to all IMSs

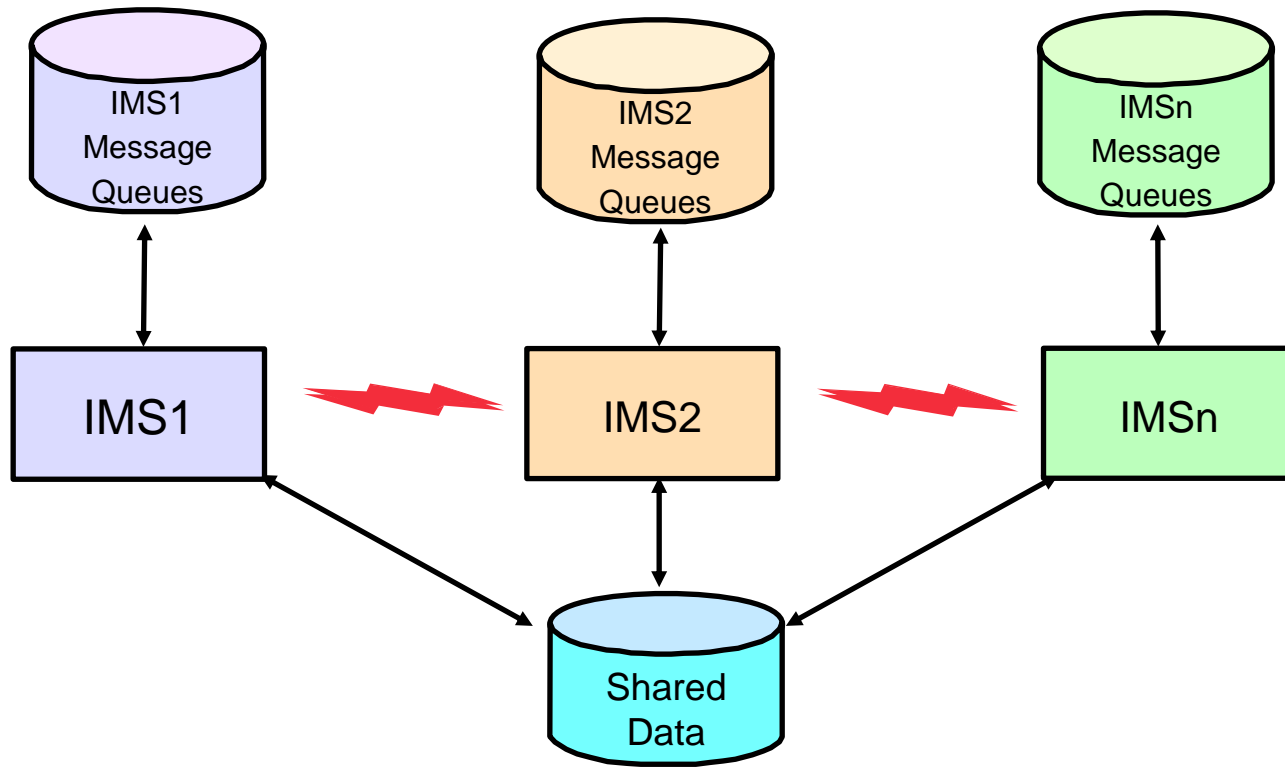
Benefits for IMS Shared Queues

- Single system image to end users
 - End user can enter a transaction to any IMS in the shared queues group
- Automatic workload balancing
 - Allows workload to be distributed across multiple IMS systems
 - Input transaction can execute on any IMS in the shared queues group
 - No single IMS can remain underutilized while others overloaded
 - Throughput is optimized up to the full capacity of the parallel sysplex
- Increased capacity for an IMS application system
 - New IMS systems can be added to process extra workload or to support peak processing periods
 - Up to 256 IMS systems on 32 z/OS images can be combined to process a single workload
- Improved reliability and failure isolation for an IMS system
 - If any IMS in the sysplex fails, any of the remaining IMS systems can process the workload in the shared queues
 - If any IMS requires a cold start, the contents of the shared queues are not affected

Focus on Improving Availability

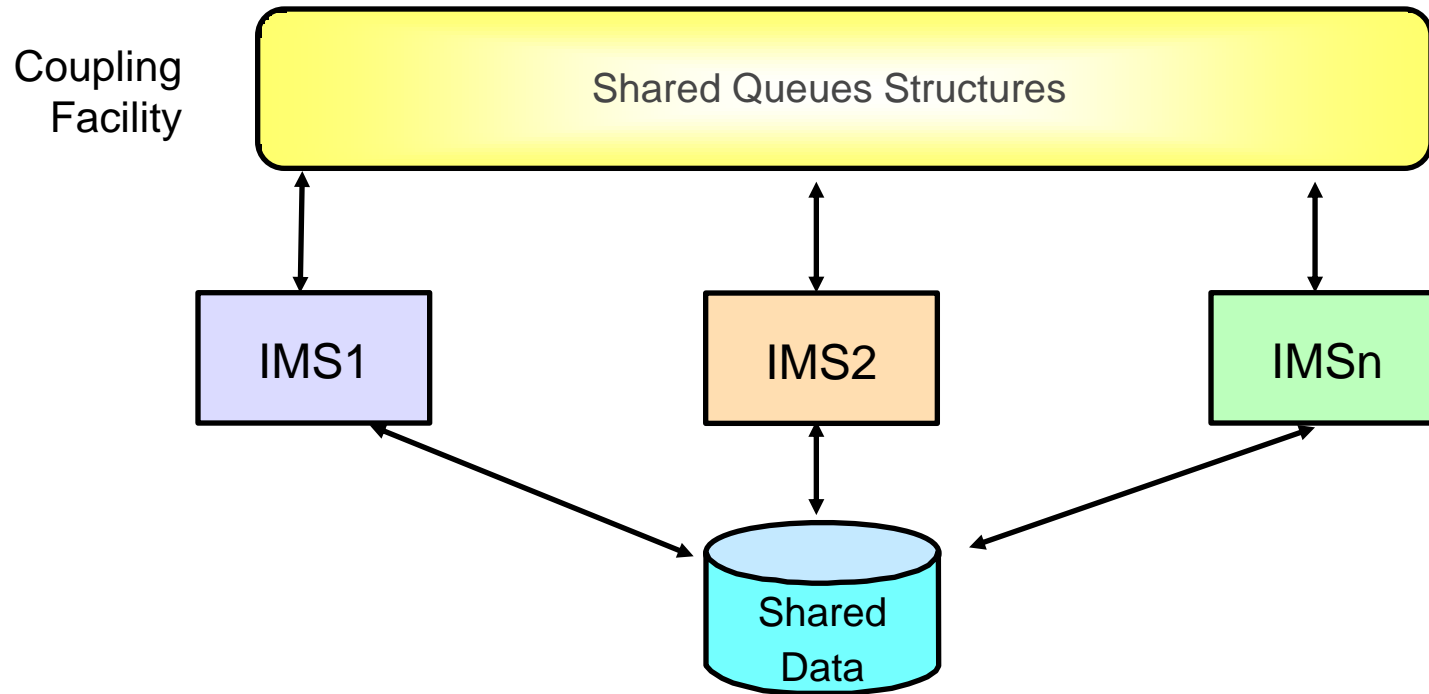
- All these benefits provide improvements to availability for IMS applications and end users
- If already in a parallel sysplex, minimal costs to get these availability improvements

Message Processing without Shared Queues



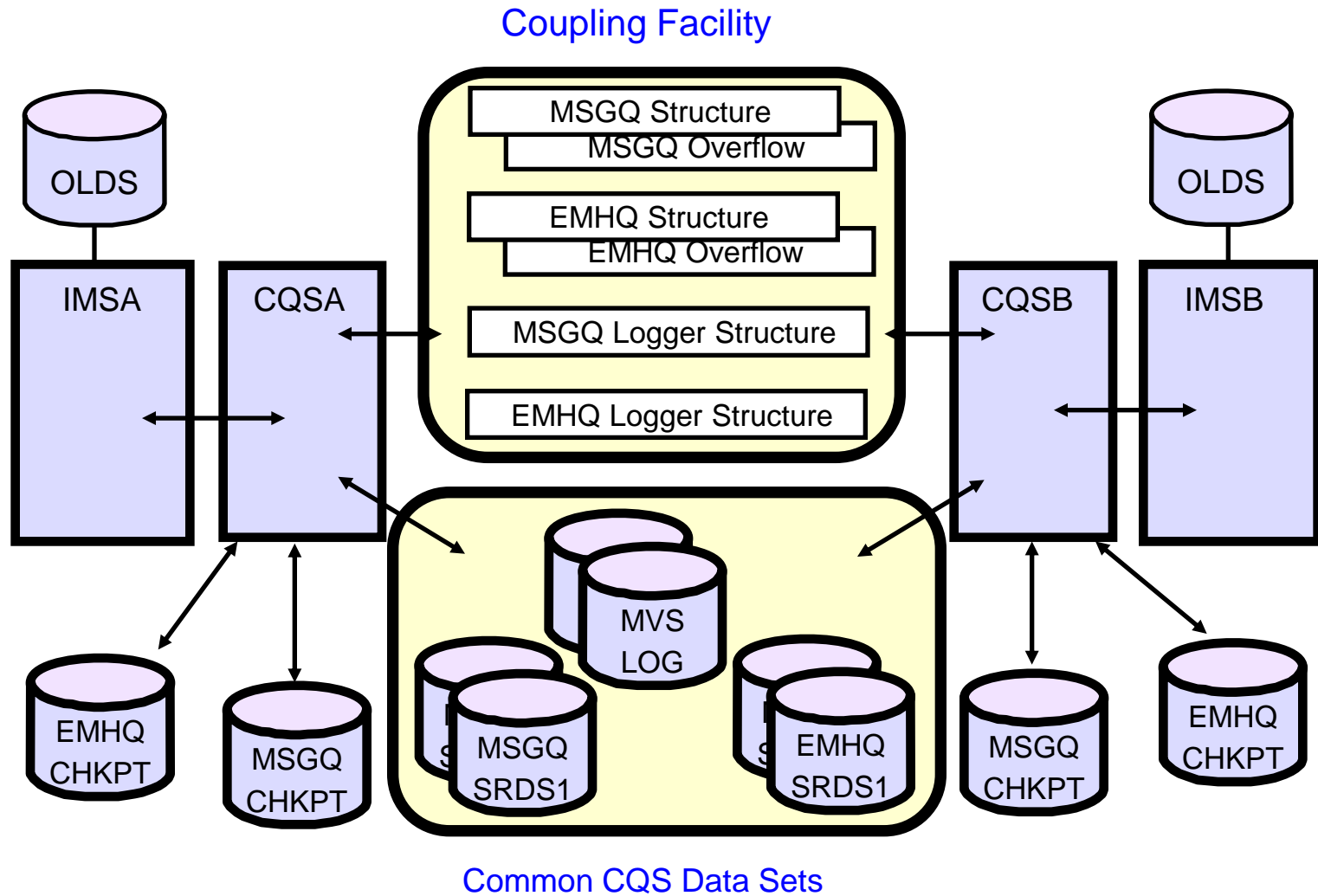
- IMSs could share the data, but each IMS has exclusive use of its own message queues
- Application load balancing among IMS systems was a user responsibility
 - Network balancing, Workload Router, MSC, ISC, APPC,

Message Processing with Shared Queues



- Individual IMS message queues have been replaced by Shared Queue Structures in the Coupling Facility
- Messages in the Shared Queue Structures are available to all IMSs

Shared Queues Components ...



An IMS Shared Queues Environment...

- Typical shared queues configurations
 - Cloned systems with similar definitions
 - Single IMS system that needs improved availability
 - Systems using Multiple Systems Routing can eliminate MSC message traffic overhead by replacing MSC links with shared queues
 - Multiple IMS systems where message availability is critical
 - Front-end / back-end processing
 - Data sharing not required

Common Queue Server (CQS)

- A generalized queuing facility that manages data objects (messages) on a shared queue on behalf of its clients (IMSS)
- Runs in its own address space and is started by IMS
- Each IMS typically has its own CQS, a 1-to-1 relationship
 - CQS multiple client support allows up to 32 different clients to use the same CQS address space within an LPAR
- IMS communicates with its CQS to manipulate IMS messages sent to and received from the shared queues
- Each CQS is connected to a common set of coupling facility structures that store these messages
- Up to 32 CQSs can be connected to these structures

Transaction Flow in Shared Queues - Message Queues

■ Local First

- Can be processed by that local IMS when it is first received if it can be processed immediately (local processing)
- Some restrictions
 - Message is not from a program-to-program switch restriction removed in IMS 13
 - Allows BMP-inserted transaction messages to be eligible for “local-first” processing in IMS14

IMS 14

■ Global

- Can be processed by any of the IMSs in the shared queues environment that have registered interest in that transaction (global processing)

■ Fast Path input edit/routing exit, DBFHAGU0, can decide

- Local Only
- Local First
- Global Only

■ SSPM (Sysplex Serial Program Management) handles the serialization of serial programs (SCHDTYP=SERIAL) across the shared queues group

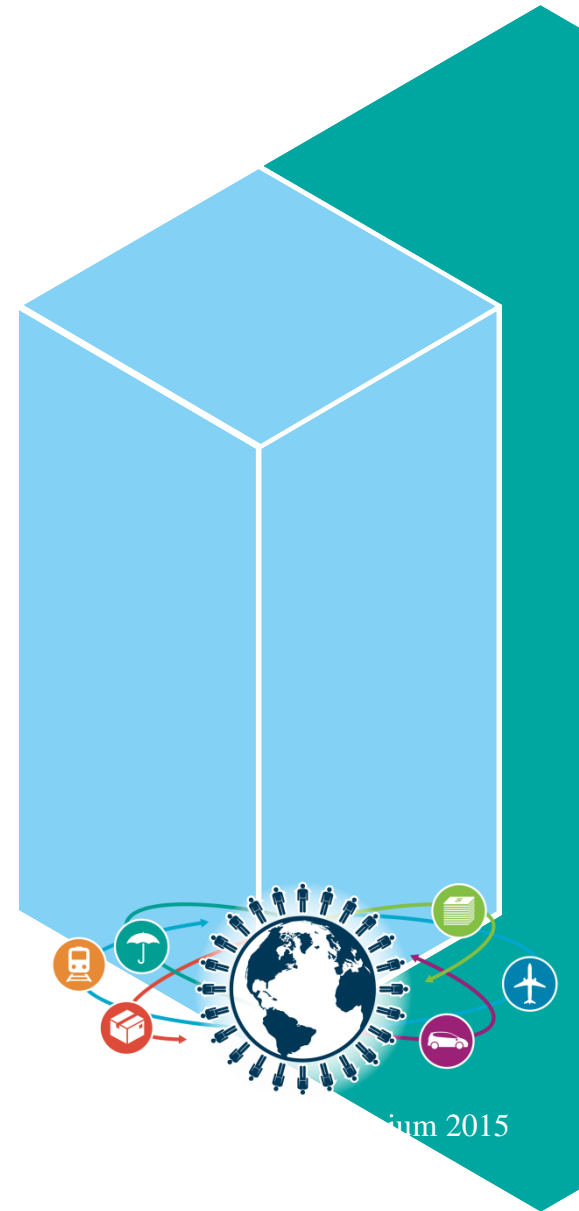
Historical OTMA support for Shared Queues

- IMS Version 7
 - Asynchronous **Commit-then-Send CMO** support
- IMS Version 8
 - Synchronous **Send-then-Commit CM1** Support
 - Requires RRS
- IMS Version 11
 - Enhancement to DFSMSCE0 to support affinity processing without RRS for certain scenarios
- IMS Version 12
 - Parameter specification
 - CM1 Sync_levels (none | commit) support without RRS
 - CM1 Sync_level (syncpoint) continues to require RRS

Summary

- IMS Shared Queues can improve application and end user availability for your IMS systems
 - Single system image
 - Automatic workload balancing
 - Increased capacity
 - Improved reliability and failure isolation
- Supports zIIP usage for response request processing for authorized CQS clients
- Lots of new concepts/components to understand but it works well

Common Service Layer



ium 2015



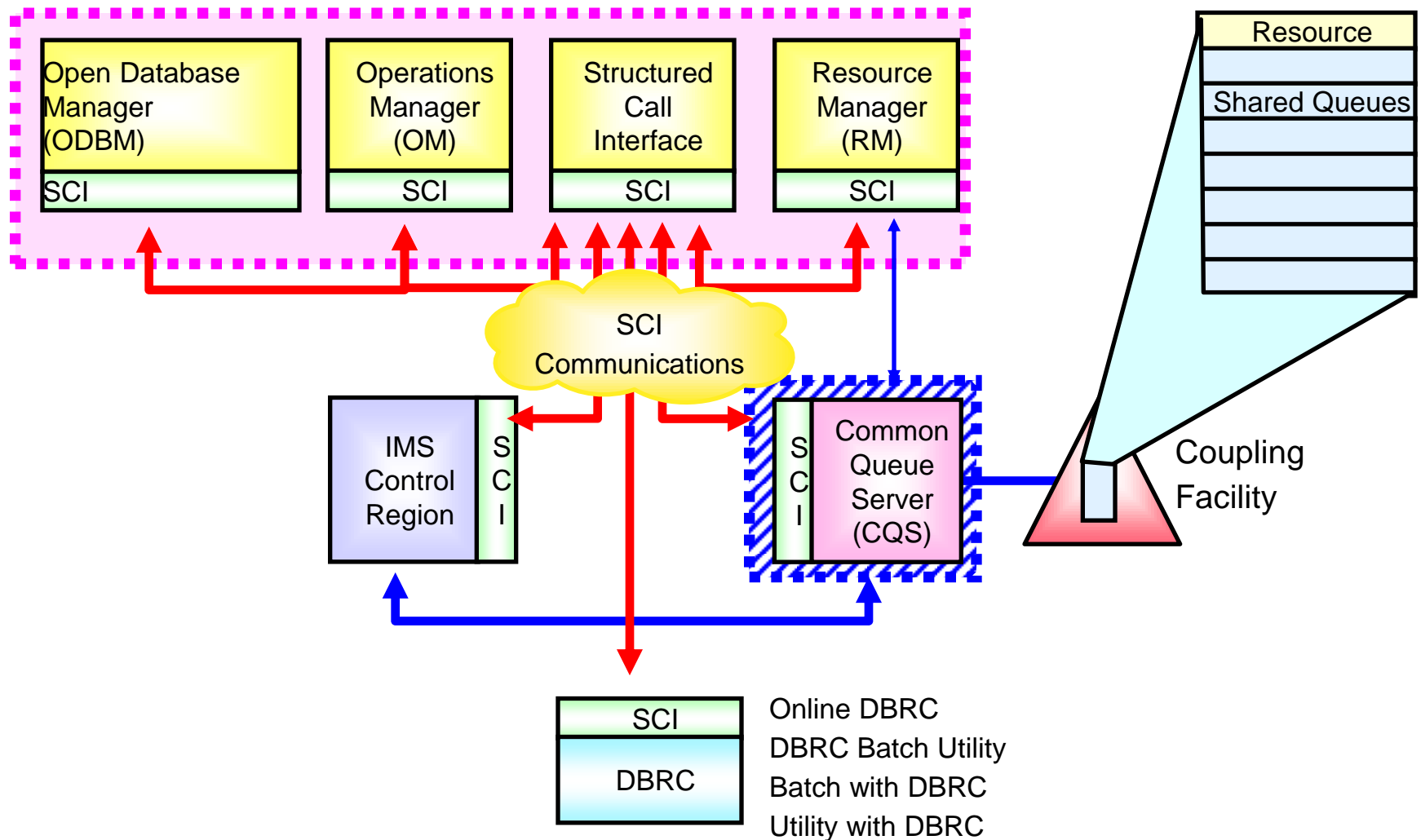
Common Service Layer (CSL) Overview

- An architecture to improve the systems management capabilities for IMS systems
 - Operations management (Operations Manager)
 - Resource management (Resource Manager)
 - IMS Database access (Open Database Manager)
- Provides
 - A single system image (IMSpIex)
 - Ease of use through a single point of control
 - Shared resources across all IMS systems
- Reduces complexity of managing multiple IMS systems

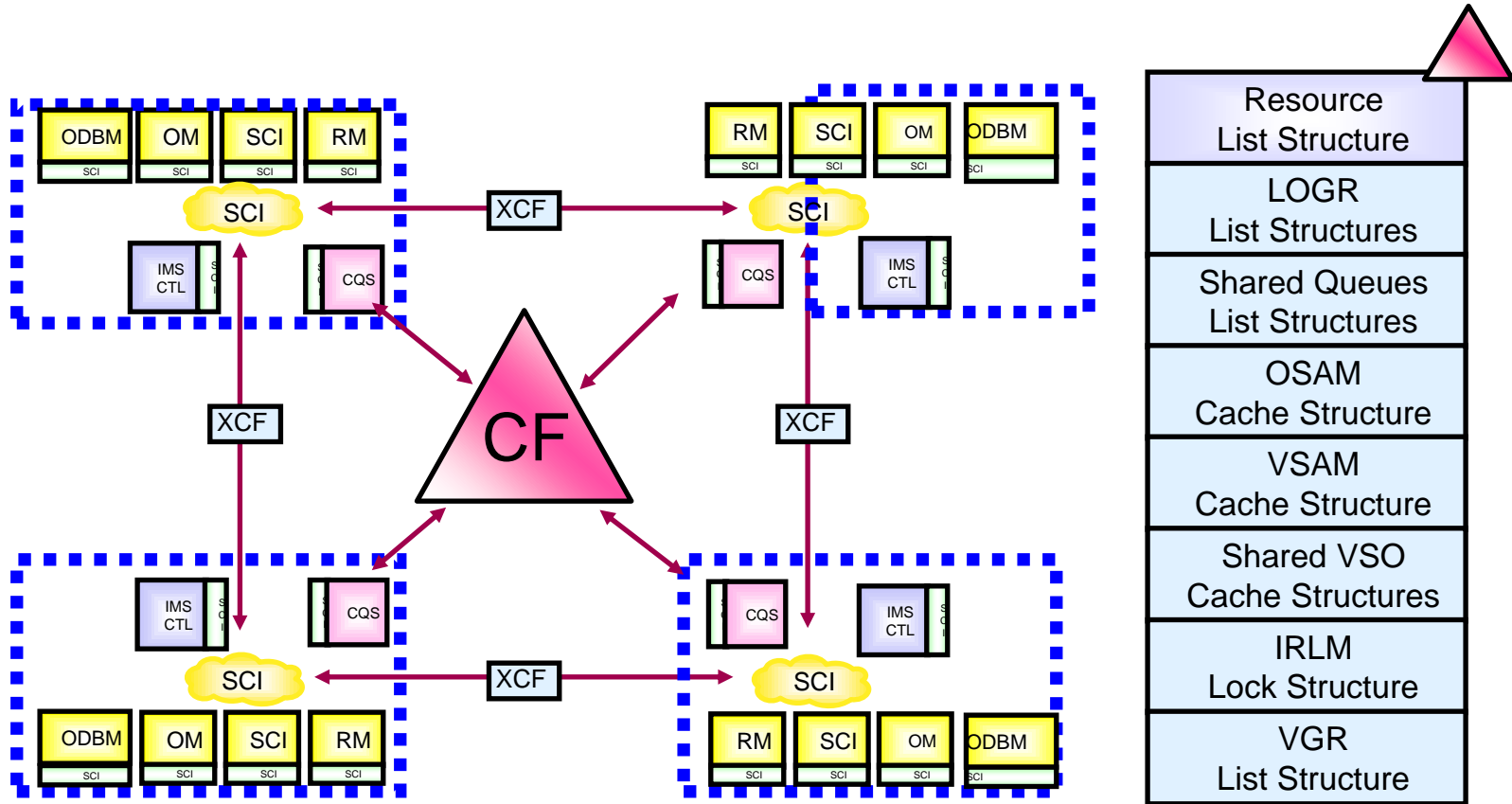
Common Service Layer (CSL) Managers

- Operations Manager (OM)
- Resource Manager (RM)
- Structured Call Interface (SCI)
- Open Database Manager (ODBM)
- Based on BPE (Base Primitive Environment)
- Can use CQS (Common Queue Server)
- New address spaces
 - OM, RM, SCI, ODBM, CQS
- New CF structures (optional)
 - Resource, shared queues

CSL Architecture



IMSpdex Configuration with Multiple IMS Systems



- In an IMSplex
 - All members share the same CF structures
 - Intra-IMSpdex communications is implemented by SCI
 - Uses XCF across z/OS images

IMS Functions using OM

- Dynamic Resource Definition (DRD)
- Manage Resources Application
- Dynamic MSC
- OM Audit Trail
- Batch SPOC Utility
- Database Quiesce
- New User Exits
- IMS Repository
- Dynamic Full Function Buffer Pools

IMS 14

- Database Quiesce
- New User Exits
- Type-2 Command Enhancements
- IMS Connect type-2 Commands
- MSC TCP/IP
- User exit enhancements
- IMS Explorer for Administration
- ISC TCP/IP
- HALDB Alter
- Load from Catalog

IMS 14

IMS Functions use RM

- ACBLIB Member Online Change
- Sysplex Serial Program Management
- Global Status
- Database Quiesce
- IMS Repository

IMS Functions using SCI

- Parallel RECON Access
- MSC TCP/IP
- ISC TCP/IP
- All functions requiring OM, RM or ODBM

IMS Functions using ODBM

- Open Database
- .NET Data Provider
- DDL Support

IMS 14

IMSplex Configurations

- CSL requires an IMSplex setup and configuration
 - IMSplex definition
 - Single-IMS IMSplex
 - Standalone IMS control region
 - No data sharing*
 - No shared queues*
 - Multiple-IMS IMSplex
 - Two or more IMS control regions, usually with
 - Data sharing*
 - Shared queues*

IMSplex Definition ...

- An IMSplex is a set of IMS address spaces that are working together as a unit and are most likely running in a parallel sysplex (but not required)
- Examples of an IMSplex configuration include:
 - A set of IMS control regions without a CSL that are data sharing or message queue sharing
 - A set of IMS control regions with a CSL that are data sharing and message queue sharing
 - A single IMS control region with a CSL
- Examples of IMSplex components are:
 - IMS subsystems (DB/DC, DBCTL, DCCTL, XRF active, XRF alternate)
 - CQS
 - CSL managers (OM, RM, SCI, ODBM)
 - IMS Connect
 - A batch or DB utility region using DBRC
 - DBRC batch utility

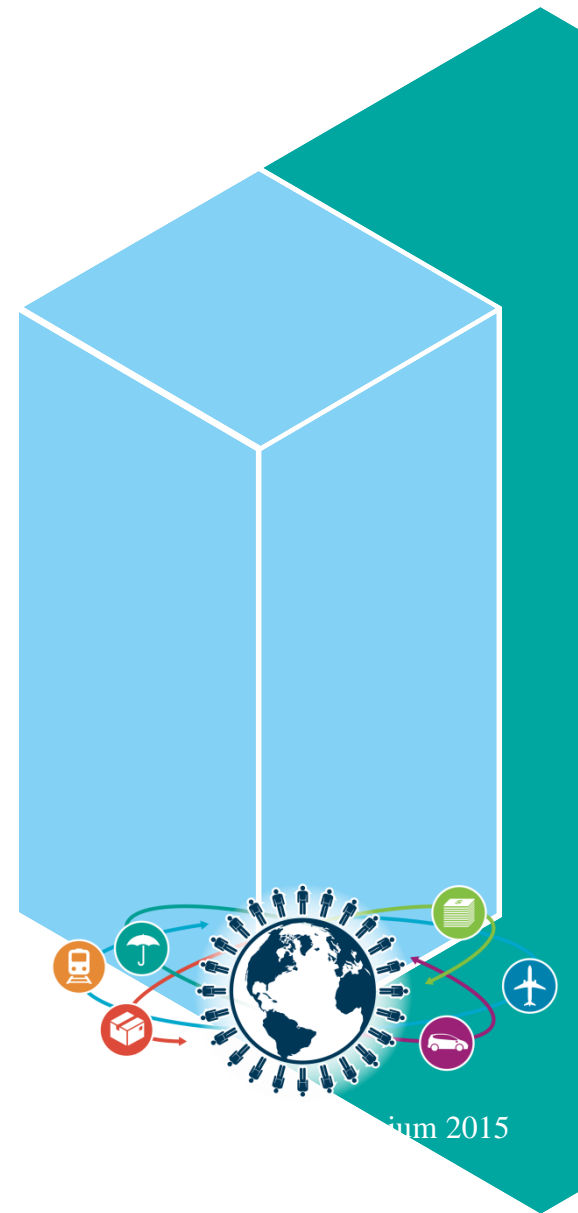
IMSplex Definition

- An IMSplex name is defined in various IMS PROCLIB configuration members to indicate that an IMSplex exists
- CSL requires the use of an IMSplex
- Each component of a particular IMSplex must use the same IMSplex name
 - Applies to single-IMS IMSplex
 - Applies to multiple-IMS IMSplex
- CSL terminology
 - SCI – an address space
 - OM – an address space
 - RM – an address space
 - ODBM – an address space
 - Resource structure – a coupling facility structure

Single-IMS IMSplex Configuration

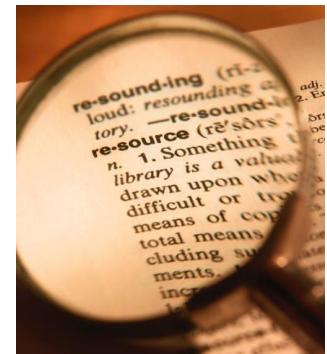
- Allows a Single-IMS System user (i.e. no data sharing and no shared queues) to exploit some CSL-based facilities
 - SPOCs and the new operations interface and functions
 - Dynamic Resource Definition
 - ACBLIB Member Online Change
 - Database Quiesce
 - Open Database
- Also called 'Enhanced Command Environment'
- Only contains SCI and OM CSL managers
 - RM and resource structure not included
- Set up by using system parameter to request this configuration
 - RMENV=N (DFSDFxxx CSL section or DFSCGxxx)
 - IMS can automatically start the SCI and OM address spaces

Dynamic Resource Definitions



Dynamic Resource Definition (DRD)

- Allow user to dynamically define and enable MODBLKS resource definitions
 - Databases
 - Programs
 - Transactions
 - Fast Path Routing Codes
 - And associated descriptors introduced with DRD
- Commands: CREATE, DELETE, UPDATE, QUERY, EXPORT, IMPORT
- Transactions can also be defined dynamically via the DFSINSX0 user exit
- 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
- Benefits
 - Improve the availability of the IMS online environment
 - No requirement for MODBLKS SYSGEN
 - No requirement for IMS restart/MODBLKS online change
 - Limitations associated with these methods eliminated

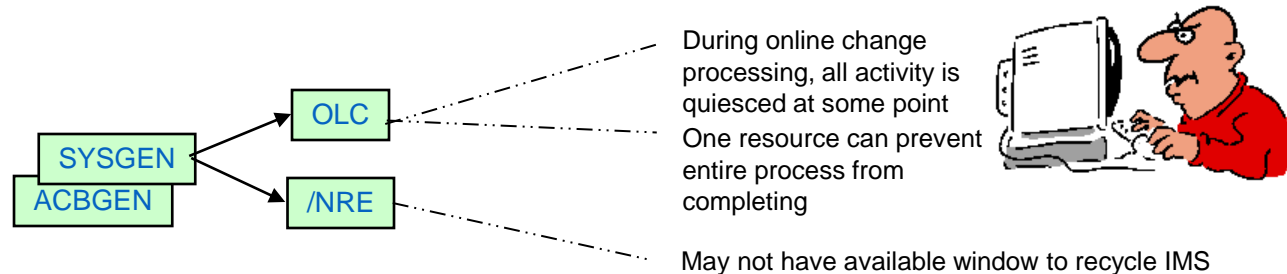


Dynamic Resource Definition (DRD)

- 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

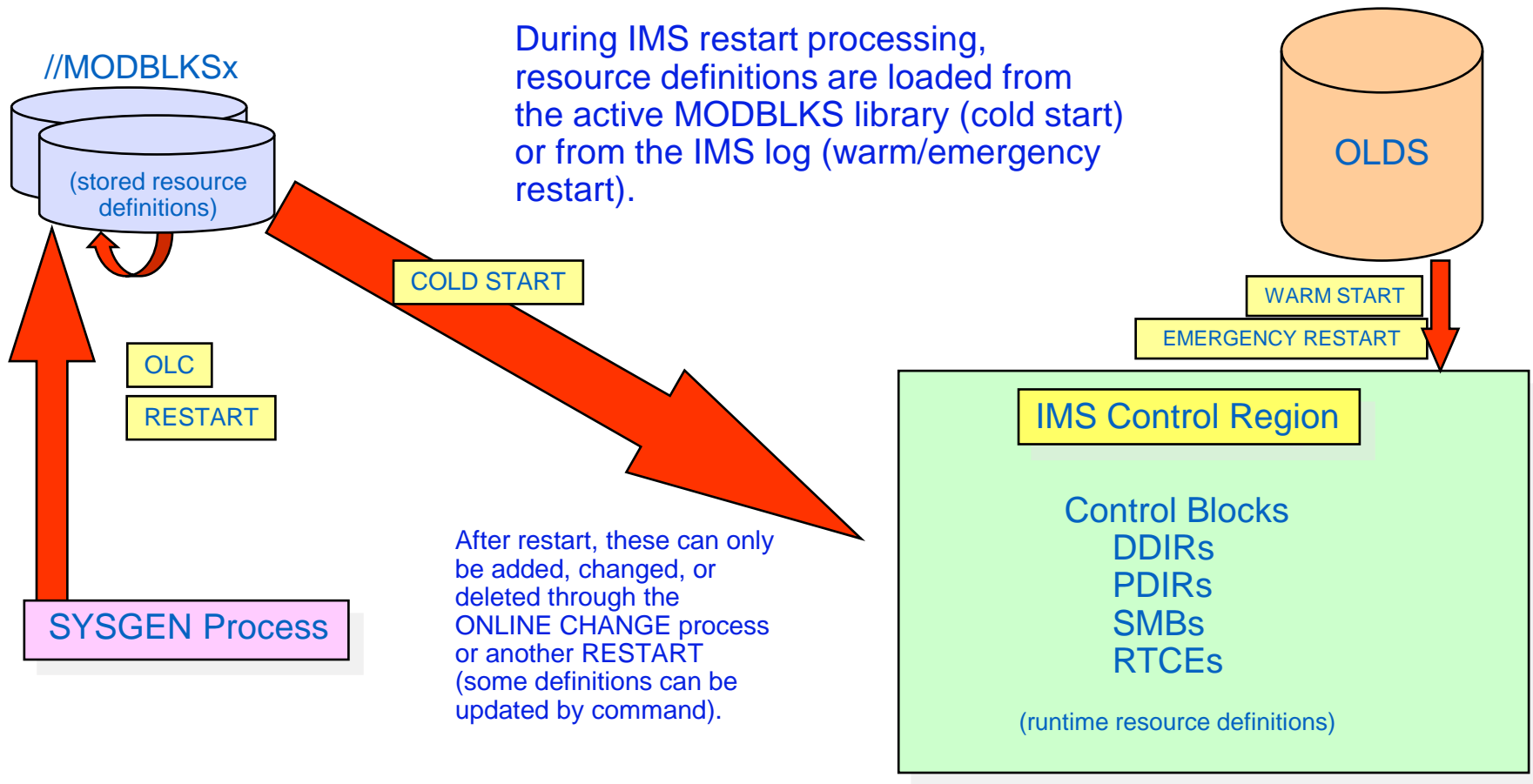
Modifying Resource Definitions without DRD

- 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



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

Modifying MODBLKS Resources without DRD



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.)

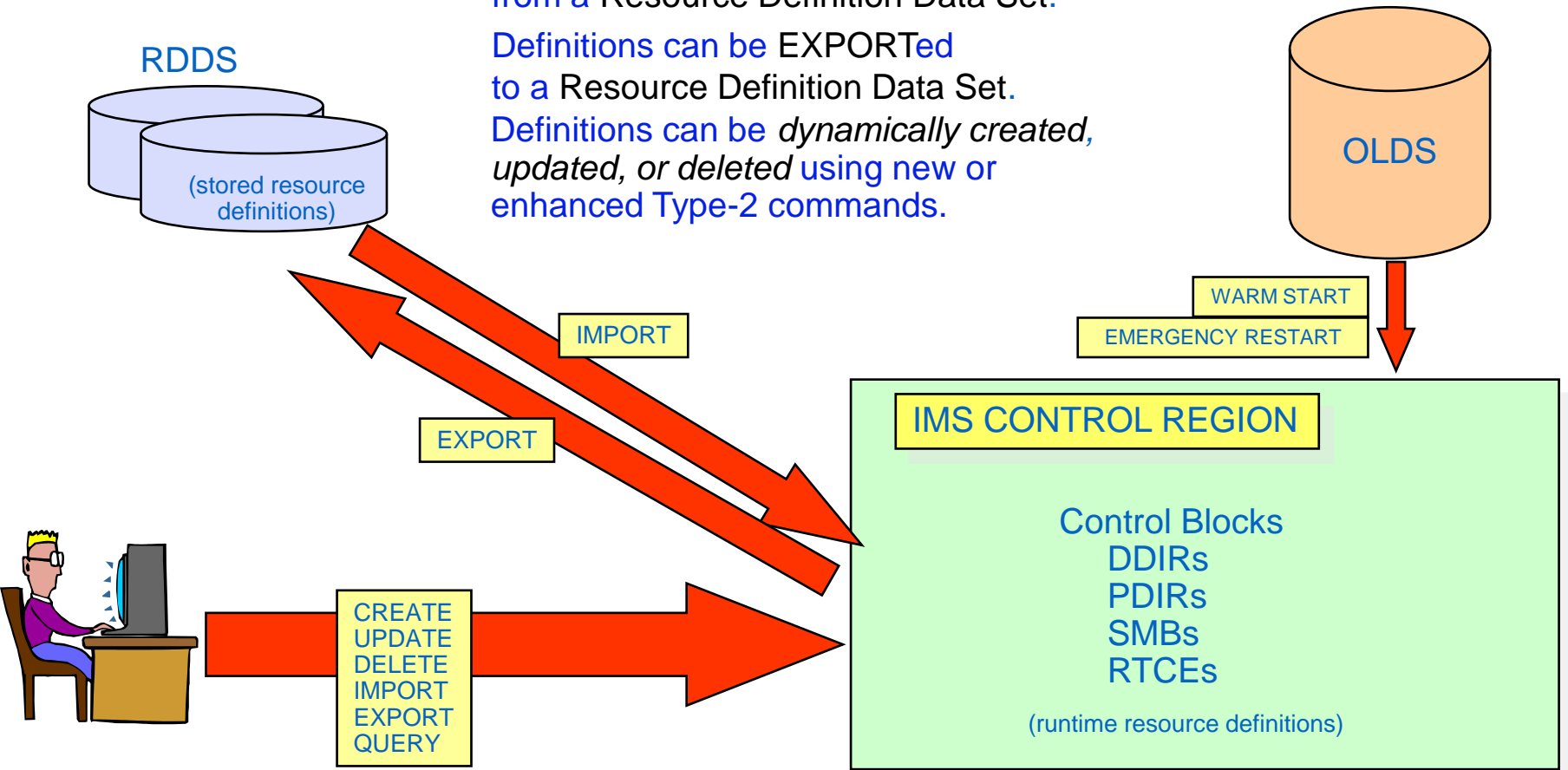
- Enhanced DFSINSX0 (Destination Creation) user exit to dynamically create program and transaction resources
- UPDATE and QUERY support for MSC resources
 - Supports resource modification without requiring system definition changes or an IMS restart
- CREATE and DELETE for MSC physical links

Modifying MODBLKS Resources with DRD

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.



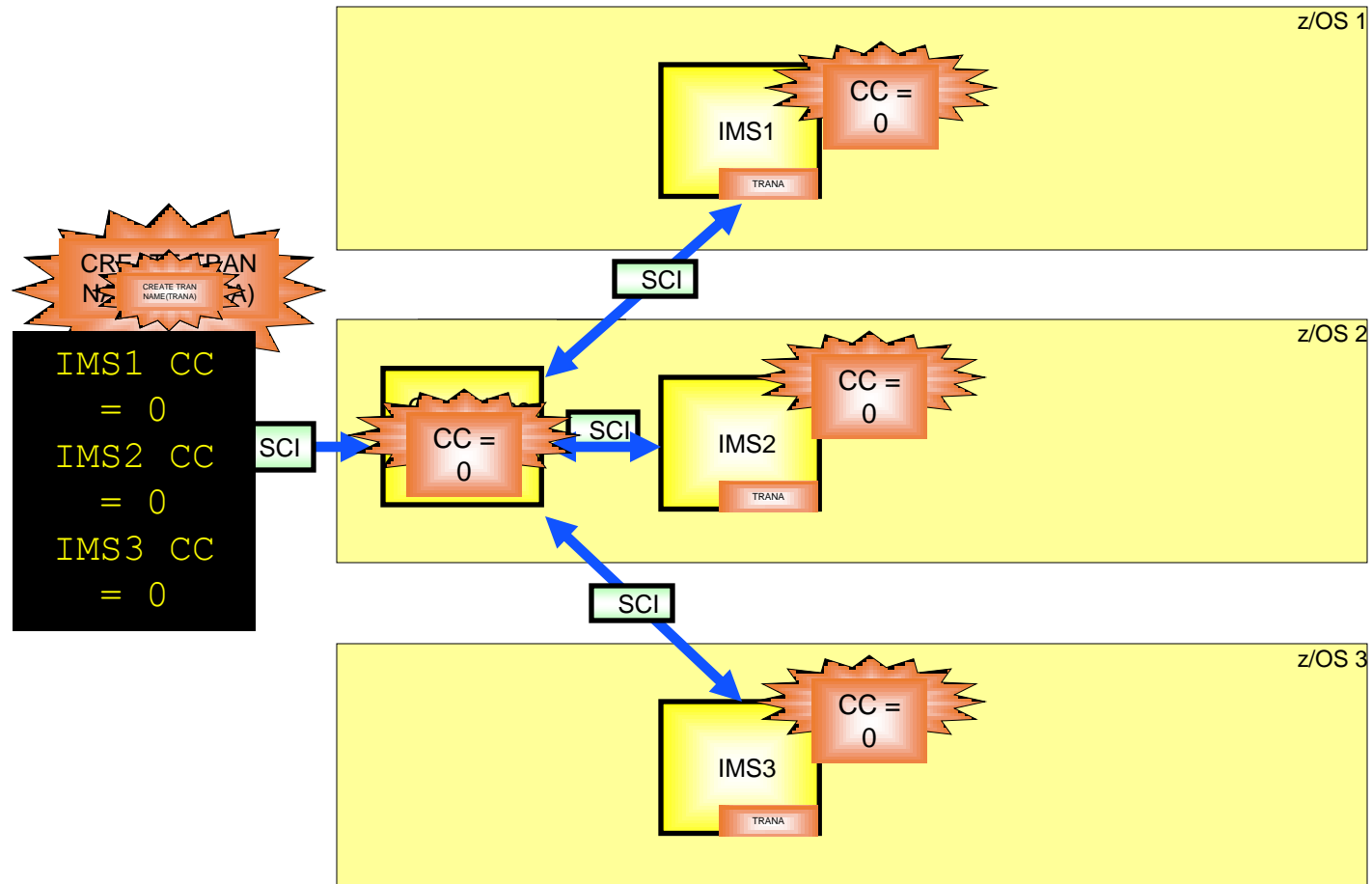
DRD Environment

- 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
- 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

Defining Resources in IMSplex



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

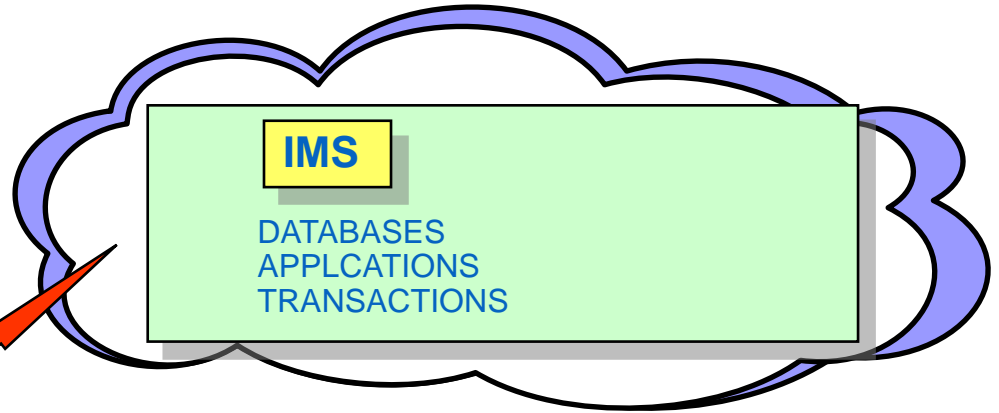
Dynamic Definition of IMS Resources

Five Essential Cloud Characteristics:

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

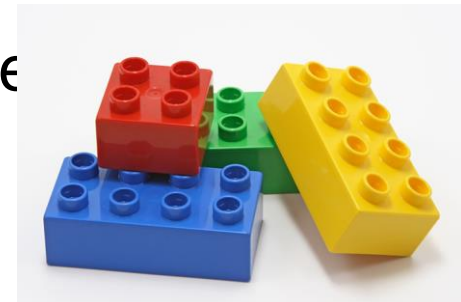


CREATE
UPDATE
DELETE
QUERY



Dynamic Resource Definition (DRD)

- OBJECTIVE: To improve the availability of the IMS online environment
- Allow user to dynamically define and enable MODBLKS resource definitions
 - Databases
 - Programs
 - Transactions
 - Routing Codes
- No requirement for IMS MODBLKS SYSGEN + IMS restart/online change
- Benefit: increased resource availability
- MODBLKS online change process not required
- MODBLKS data set not required

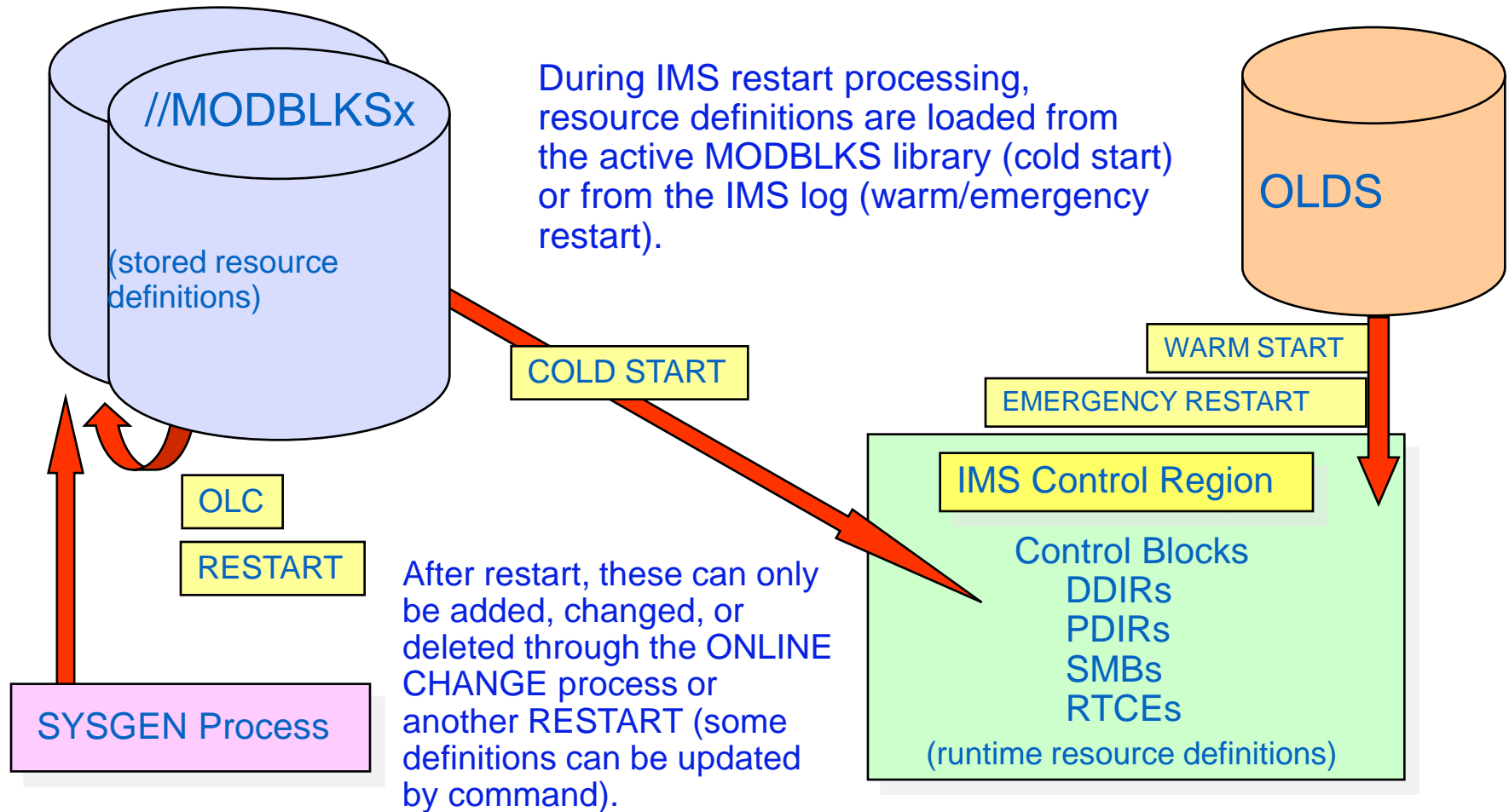


Dynamic Resource Definition

- Supports MODBLKS resources which are represented by control blocks that define resources and their attributes in a running IMS system
- Control block is generated for a MODBLKS resource when its respective SYSGEN macro is run

RESOURCE TYPE	SYSGEN MACRO	CONTROL BLOCK
Database	DATABASE (DB/TM, DBCTL)	DDIR (Database Directory)
Application Program	APPLCTN (DB/TM, DBCTL, DCCTL)	PDIR (Program Directory)
Transaction	TRANSACT (DB/TM, DCCTL)	SMB (Scheduler Msg Block)
Routing Code	RTCODE (DB/TM, DCCTL)	RTCE (Routing Code Table Entry)

Modifying MODBLKS Resources without DRD



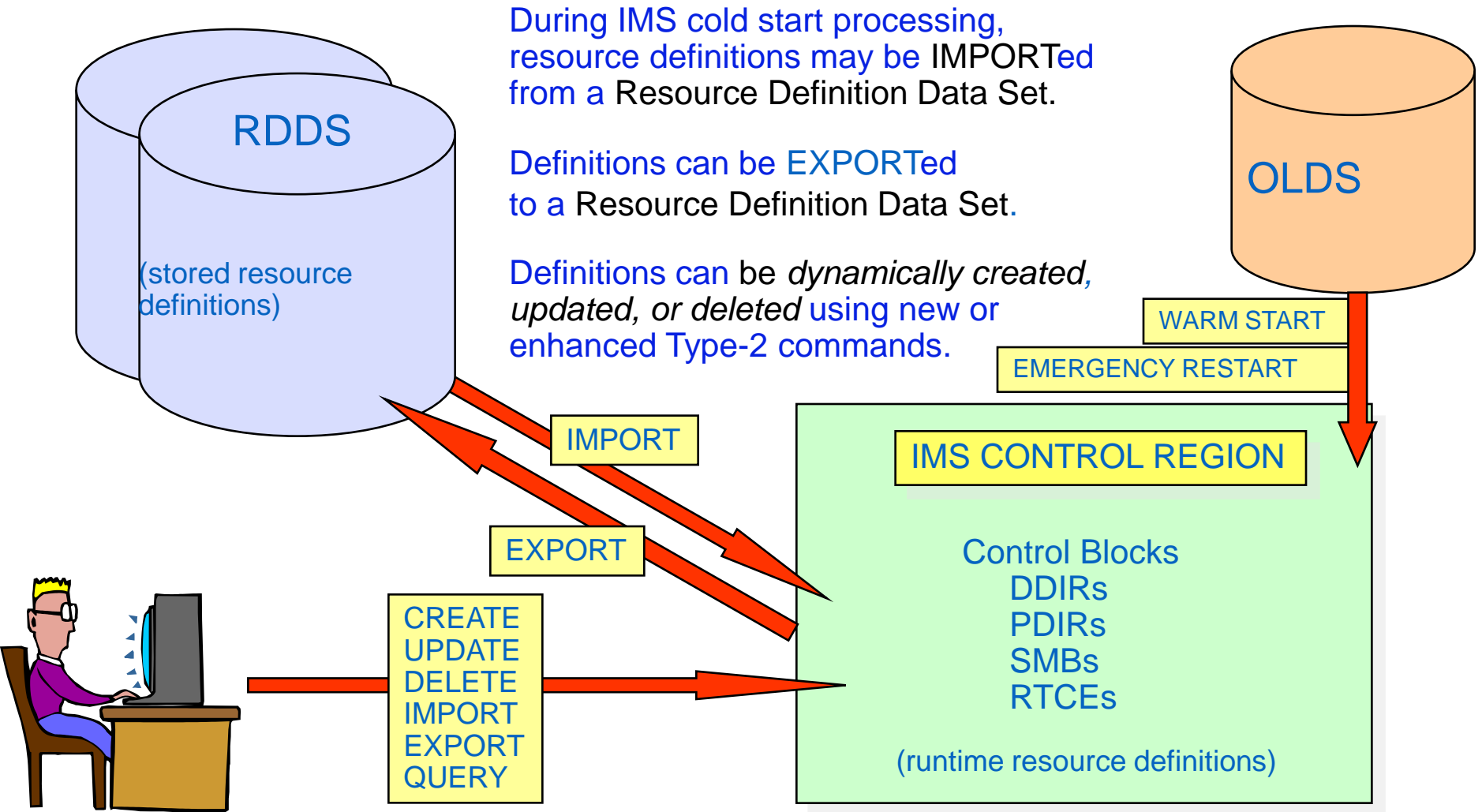
DRD Components

- Type-2 commands: CREATE, DELETE, UPDATE, IMPORT, EXPORT
- Set of *resource definition data sets* (RDDS) or IMS Repository
 - 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

DRD Components

- 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

Modifying MODBLKS Resources with DRD



DRD Environment

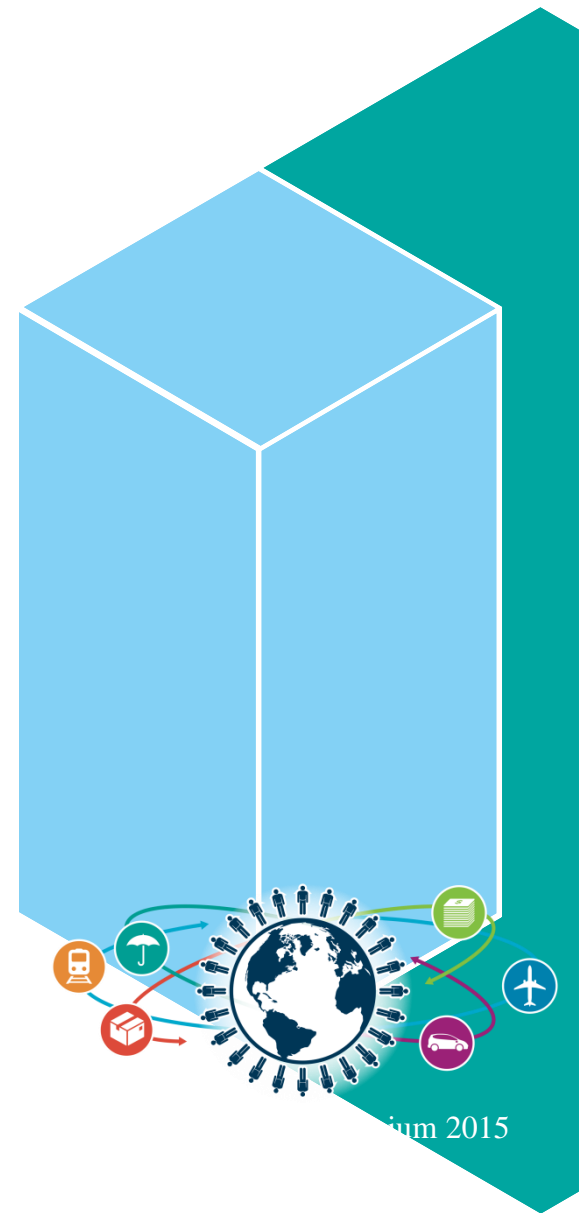
- DRD requires :
 - Common Service Layer with Structured Call Interface and Operations Manager (CSL with SCI/OM)
 - Resource Manager is not required
 - IMS PROCLIB members with DRD enablement parameters
 - DFSDFxxx (new in IMS 10)
 - DFSCGxxx (CSL parameters - can be replaced by section of DFSDFxxx)
 - Data sets to hold resource definitions (RDDSs)
 - Entry point for DRD commands
 - TSO Single Point Of Control (SPOC), IMS Control Center, or other OM interface
- All IMS online environments supported, including data sharing and shared queues

Commands Used in Dynamic Resource Definition

- Type-2 commands entered through OM interface

Command	Short Form	Purpose
CREATE	CRE	Create resource or descriptor
DELETE	DEL	Delete runtime resource or descriptor (either runtime or stored definition)
UPDATE	UPD	Update attributes of resource or descriptor Update status of resource
IMPORT	IMP	Import resource or descriptor definitions
EXPORT	EXP	Export resource or descriptor definitions
QUERY	QRY	Query attributes of resource or descriptor Query status of resource

IMS Repository



IMS Repository Function Usage

- The various components of the IMS repository function provide a centralized storage and retrieval solution for resource definitions
- 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 RDDSs (resource definition data sets) for DRD
 - Replaces one or more sets of RDDSs in an IMSplex with a single repository
 - Eliminates the need to manually coordinate and manage separate RDDSs per IMS across a multiple-IMS IMSplex
 - Provides an alternative to using MODBLKs with SYSGEN and online change
 - Considered a strategic alternative to the RDDS
- IMS can retrieve the stored resource definitions from the IMSRSC repository to dynamically generate runtime resources for DRD

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

IMS Repository Function

- 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 had added and AUTOEXPORT capability and the ability to query resources not yet exported

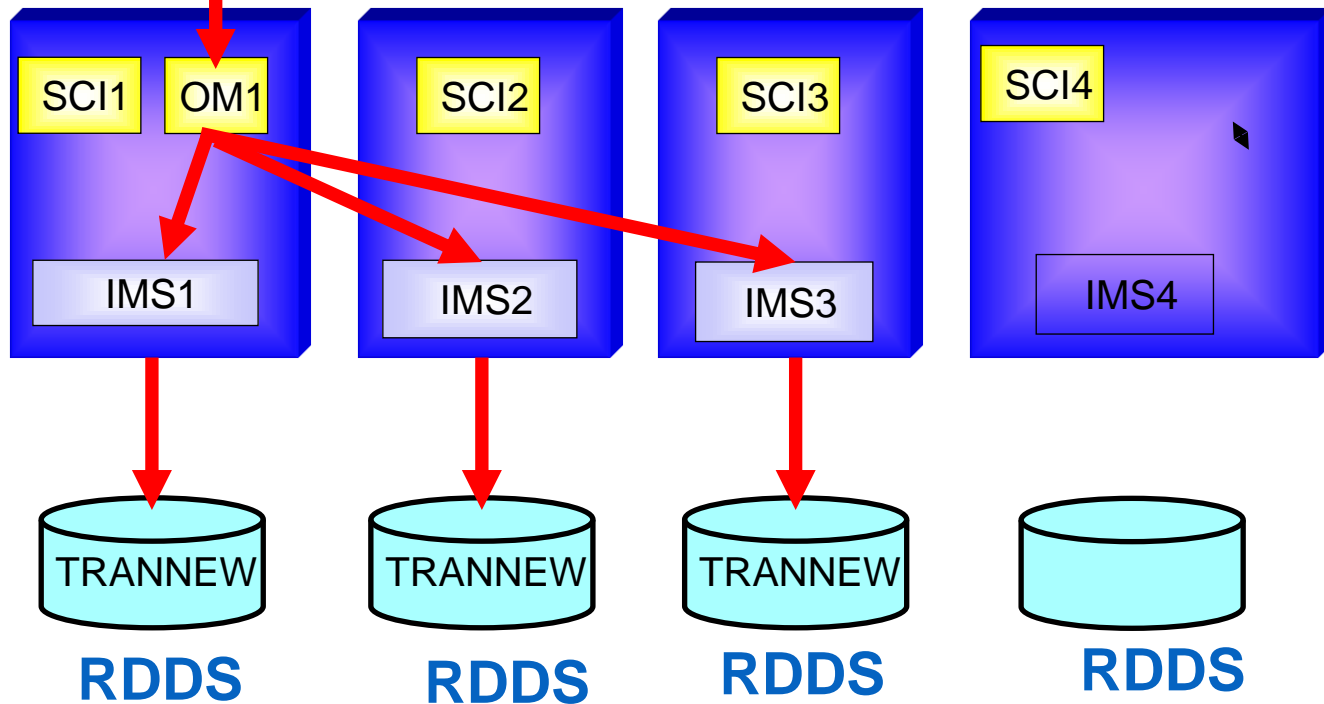
IMS 14

IMS DRD Resources and RDDS



CREATE
TRAN (TRANNEW)

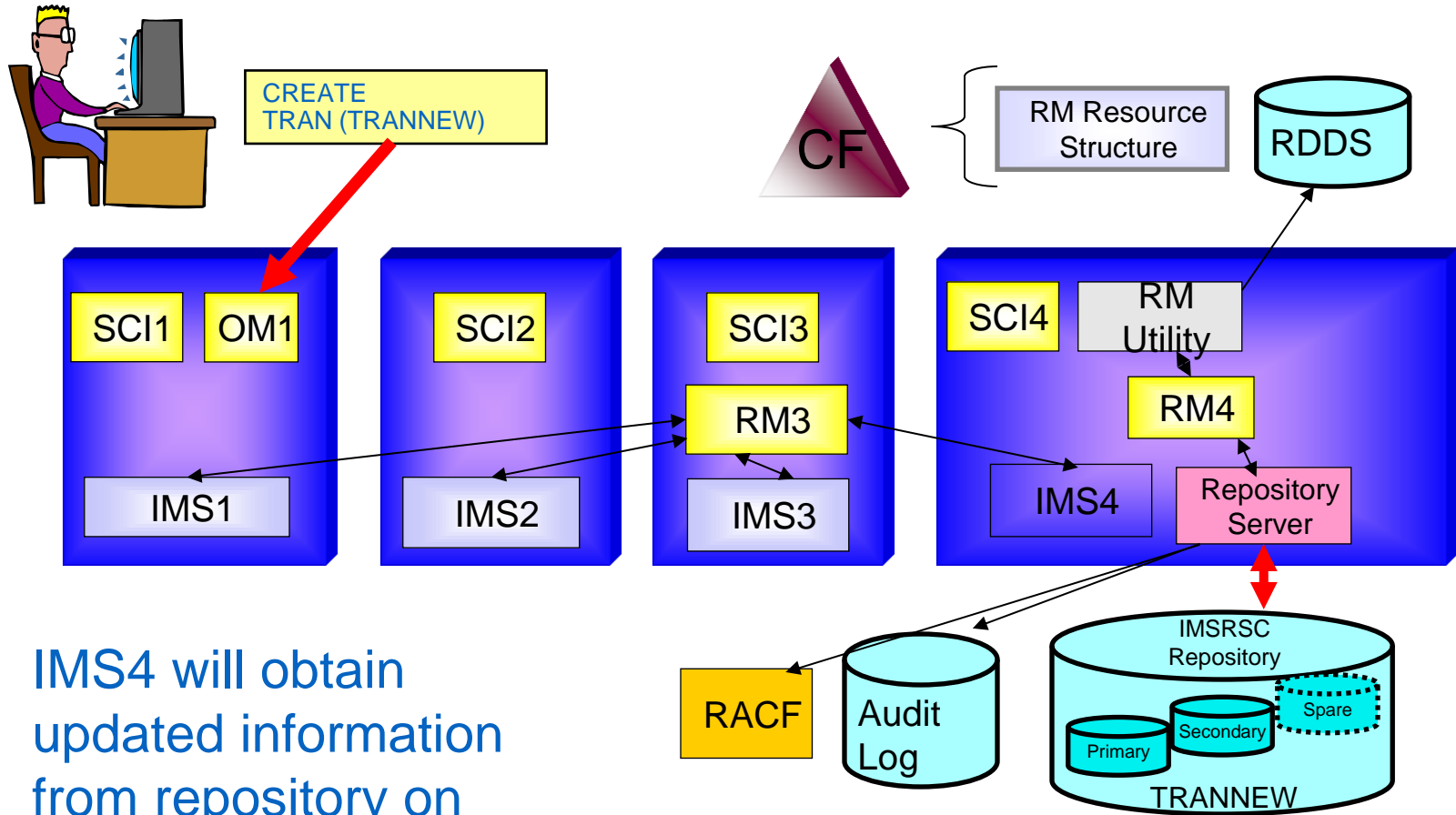
IMS4 unaware of new tran
Requires extra steps to update IMS4
RDDS



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 RDDs for migration purposes

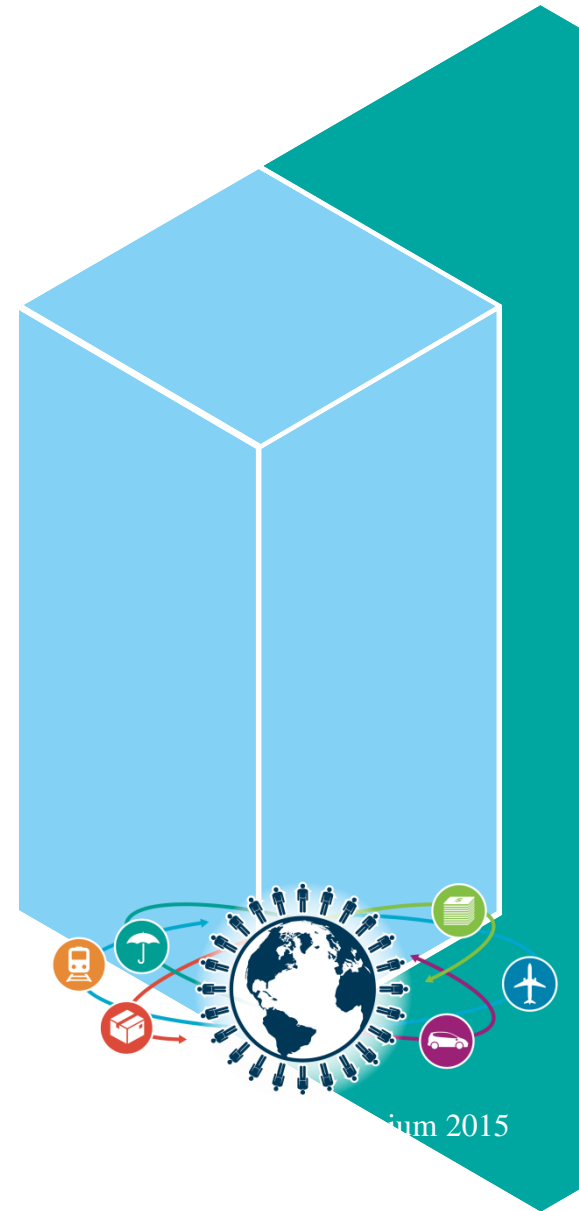
IMS Repository for DRD Resources



IMS Repository Function Benefits

- Consolidation of resource definitions in a single place, the repository
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Dynamic MSC



MSC Considerations

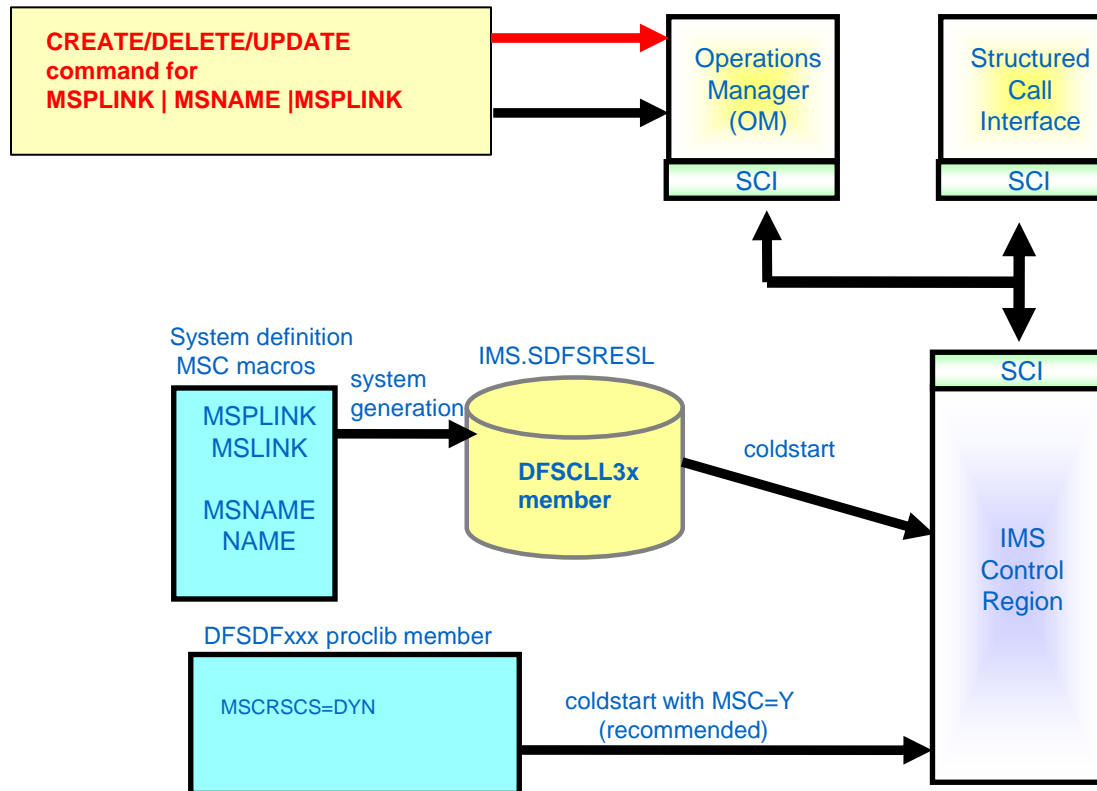
- Static MSC definitions require an outage to change
- Can manage aspects of network dynamically – with planning
- Define dummy “spare” links in your sysgen
 - Can **dynamically add** logical sessions and create connections as needed to an IMS
- **Dynamically modify** and activate dummy definitions
 - 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

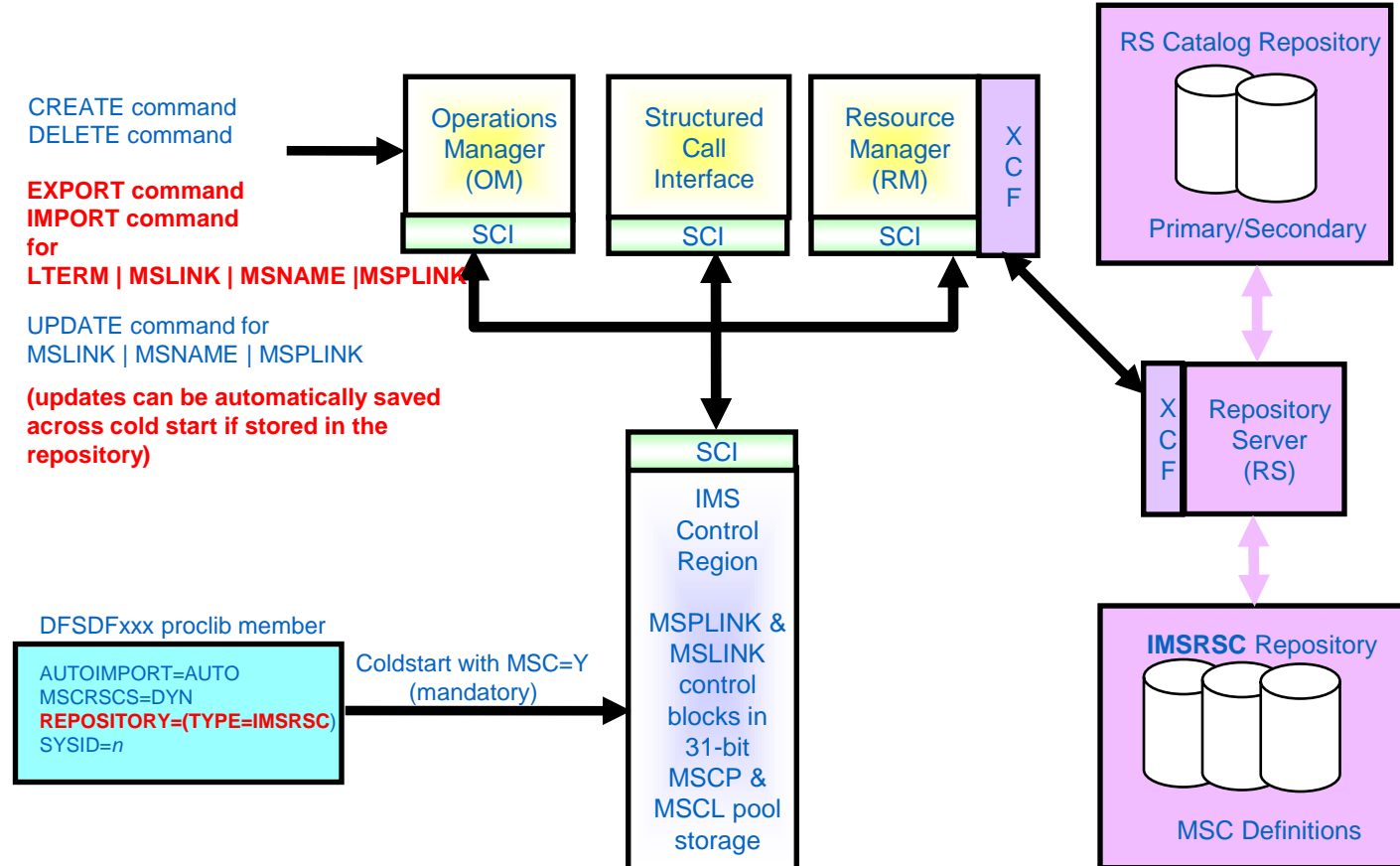


MSC Considerations

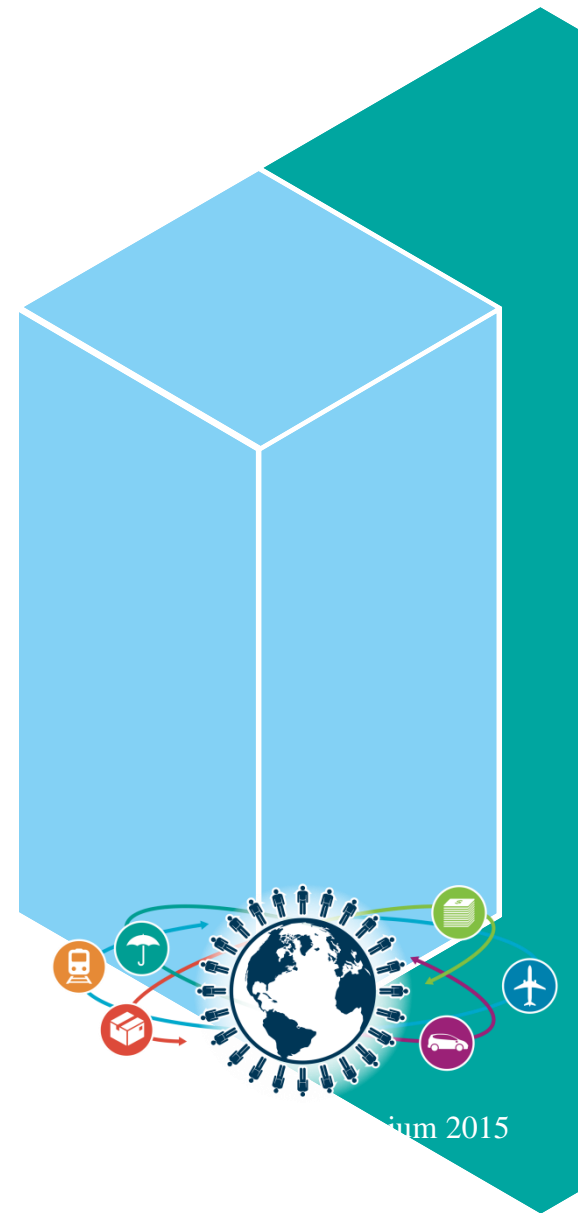
- Static MSC definitions require an outage to change
- Can make manage aspects of network dynamically – with planning
- Define dummy “spare” links in your sysgen
 - Can **dynamically add** logical sessions and create connections as needed to an IMS
- **Dynamically modify** and activate dummy definitions
 - UPDATE MSPLINK, MSLINK, MSNAME
 - Allows you to change most MSC configuration characteristics
- *IMS 14*
 - *Ability to dynamically add and delete resources through enhancements to the IMS type-2 CREATE and DELETE commands.*

IMS 14

Dynamic MSC Environment With IMSRSC Repository, no sysgen (Repository SPE)



Applications



Enable faster rollout of application changes with less manual effort

IMS 14

- IMS optimizes the scheduling process allowing an application to remain scheduled waiting for the next input message
 - Eliminates unnecessary application program termination and rescheduling improving performance and reducing CPU usage
 - Pseudo Wait-for-Input (PWFI) option for MPP and JMP regions
 - BMP transactions defined WFI
 - Adds to operational processes to refresh application
- New command to terminate these applications in order to refresh an application
 - UPDATE PGM START(REFRESH)

Why this is important

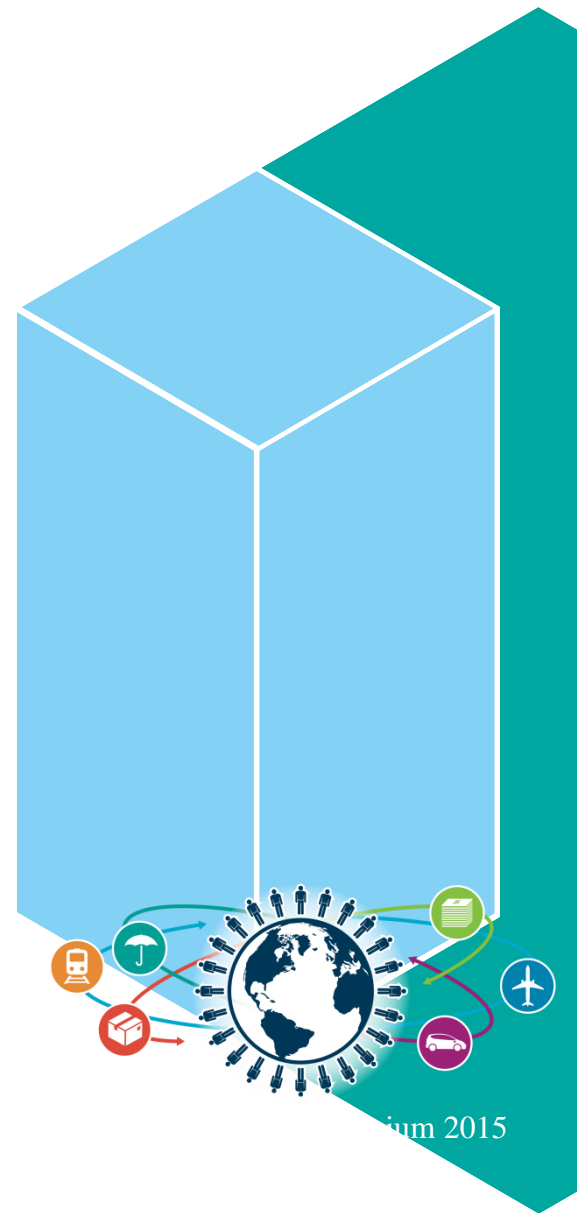
- Enables faster rollout of application changes with less manual effort
- Reduces data integrity exposures due to missed application changes



Application Scheduling Tuning

- Tuning can minimize scheduling overhead and reduce CPU usage
 - **PARLIM, MAXRGN, PROCLIM, PWFI**
- Parallel scheduling allows greater throughput, limit the number of regions a transaction can be scheduled in so it doesn't consume all available regions
- Quick reschedule avoids unnecessary termination and scheduling
 - Invoked when PROCLIM count > 0
 - When PROCLIM reached and the same transaction would be rescheduled, next message is returned
- PWFI (Pseudo wait-for-input) allows MPP/JMP regions to remain scheduled until another input message is available
 - Can eliminate unnecessary application program termination and rescheduling
 - Certain processes in IMS will cause program termination
- Some considerations
 - Give each high-volume transaction its own class and its own dedicated region(s) and use PWFI
 - Put low-volume transactions in 'shared' regions use one or few classes for them
 - Use 'shared' regions for 'overflow' of high-volume transactions
- These are a few thoughts related to scheduling
 - A lot of factors are involved and settings need to be tied to your specific workload
 - Consider a Health Check focused on application scheduling
 - IBM provides various Health Check Services for a fee

User Exits



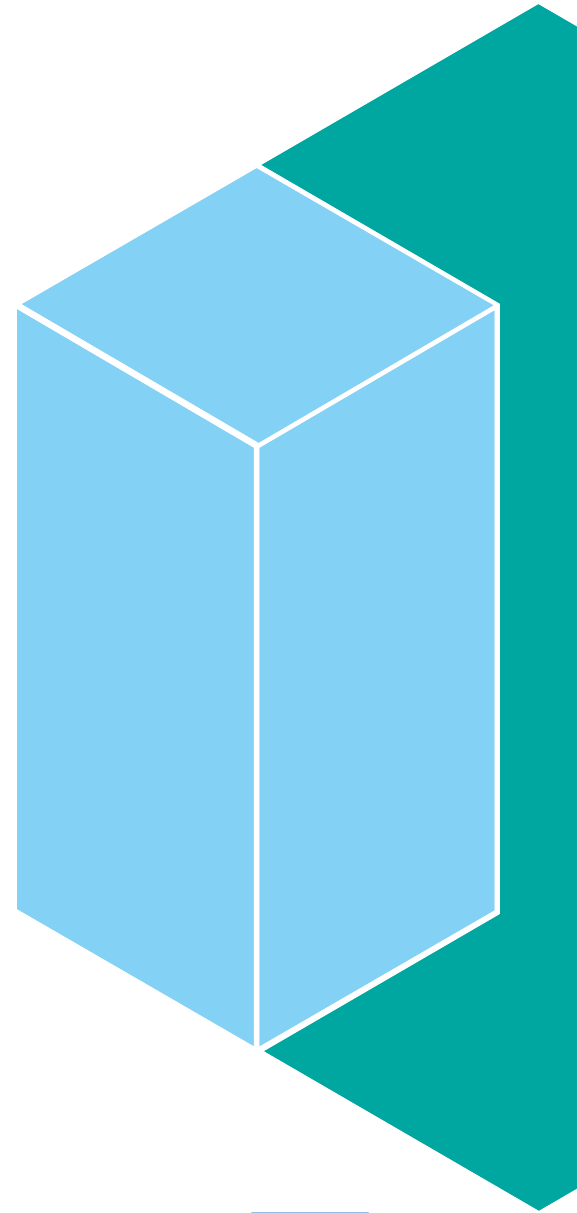
Refreshable User Exits

- Refresh user exits **without an IMS system outage**
 - REFRESH USEREXIT command
- IMS 14 **added** following exit “*types*” to support a list of exit names
 - *AOIE* *Type-2 Automated Operator User Exit*
 - BSEX Build Security Environment Exit (DFSBSEX0)
 - ICQSEVNT IMS CQS Event user exit
 - ICQSSTEV IMS CQS Structure Event user exit
 - *IMSMON* *IMS Monitor User Exit*
 - 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 (DFSPPE0)
 - 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 and simplifies user exit management

IMS 14

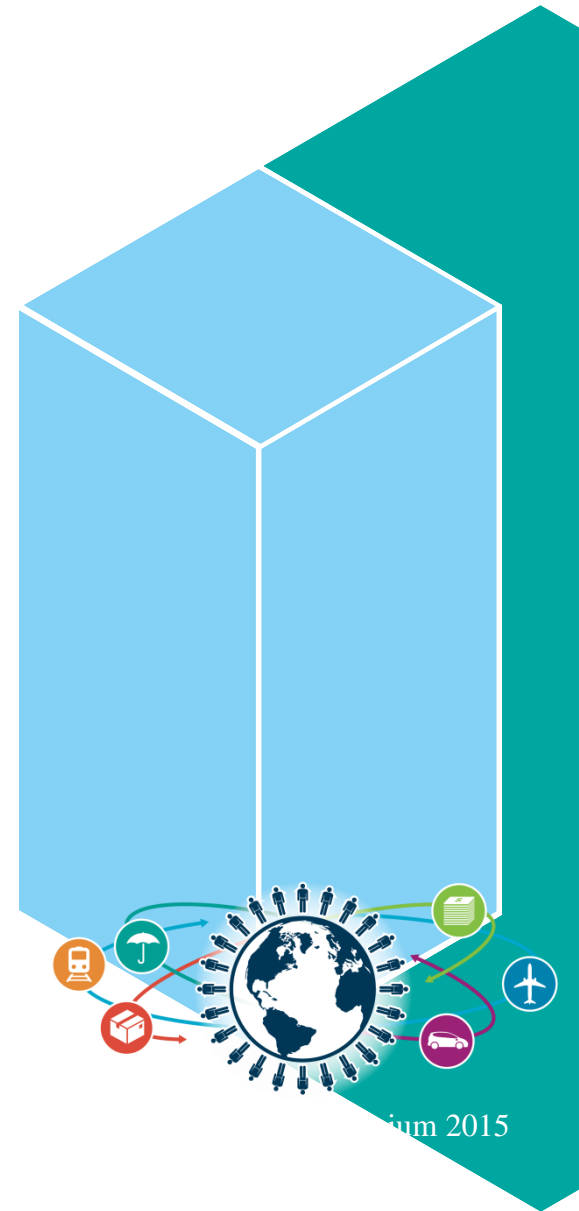
IMS 14

DBRC and RECON



- Upgrade does not require IMSs to be shutdown
 - Best practices is to ‘clean’ RECONS before upgrade to minimize duration
 - DELETE.LOG INACTIVE
 - Clean up old PRILOG information*
 - CLEANUP.RECON
 - Clean up recovery related records up to a specified timestamp*
 - Can then upgrade each IMS individually so no total outage
- IMS does not need to be shutdown during time change
 - Understand you may still have applications that cannot tolerate the time change and may require an outage

IMS Connect



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IMS Connect Dynamic Changes

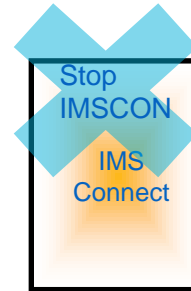
- **Dynamically create** IMS Connect resources through commands
 - For PORT and DATASTORE
 - *IMS 14 Delete support for PORT and DATASTORE*
 - *IMS 14 Create and Delete support for IMSPLEX*
- Automatically refresh cached userids by listening to RACF events (ENF signals)
- Provides higher availability **by not needing to restart** IMS Connect to make definition changes.

IMS 14

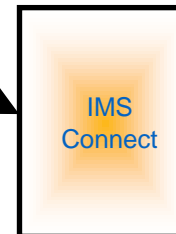
Non-dynamic IMS Connect Change

1. Update Datastore definition
in HWSCFGxx member

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



2. Restart IMS
Connect

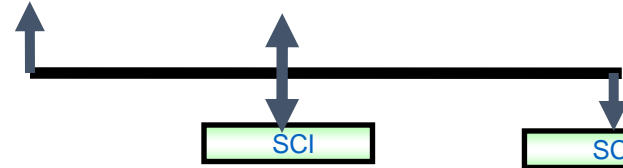
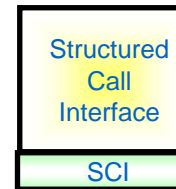
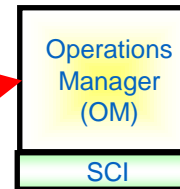


Dynamic IMS Connect Datastore Change

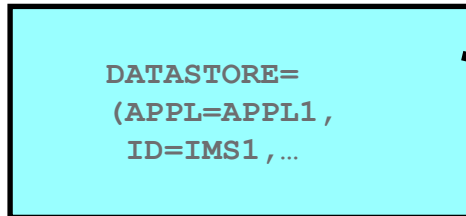
1. Issue type-2 CREATE command



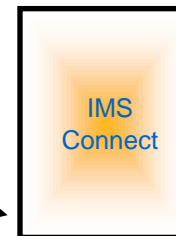
```
CREATE IMSCON TYPE(DATASTORE)  
NAME(IMS1) SET(APPL(APPL1), ...
```



HWSCFGxx Member



For Connect Restart



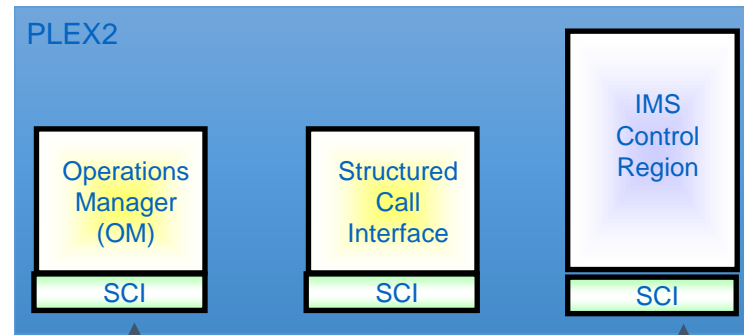
2. Update DATASTORE
definition in HWSCFGxx
member for IMS Connect
restarts

Dynamic IMS Connect Datastore Change

1. Issue type-2 CREATE command



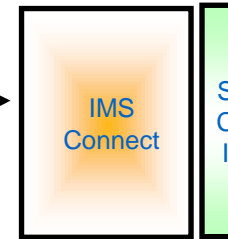
CREATE IMSCON TYPE(IMS PLEX)
NAME(PLEX2) ...



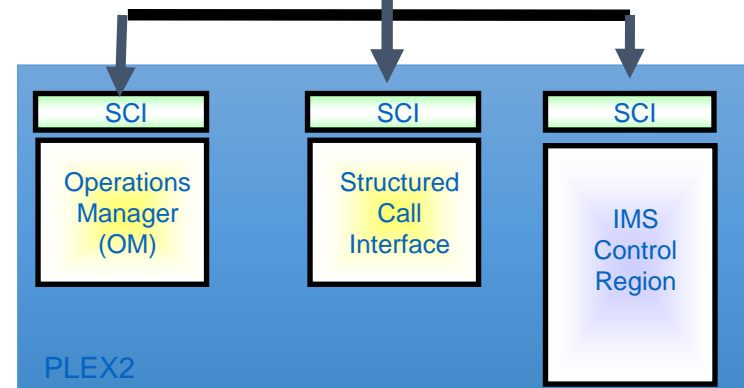
HWSCFGxx Member

IMSPLEX=
MEMBER=HWS1 ,
TMEMBER=PLEX2)

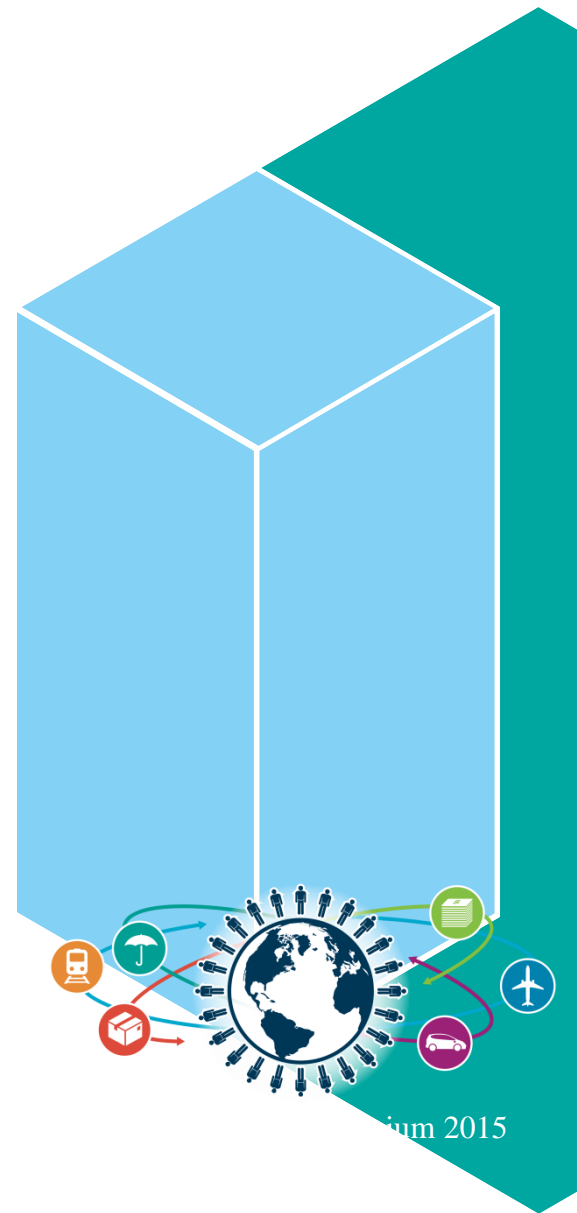
For Connect
Restart



2. Update IMSPLEX definition in HWSCFGxx member for IMS Connect restarts



Connectivity through OTMA



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IMS OTMA Flood Control Options

▪ Defining Input Message Flood Thresholds

- The default flood threshold for an individual OTMA client is 5000 . The default can be changed by:
 - OTMA client bid request
 - OTMA client descriptor (INPT=)
 - /START TMEMBER client name INPUT maximum threshold command
- The default global flood threshold for ALL clients is 10,000. The default can be changed by:
 - OTMA client descriptor with DFSOTMA system client (INPT=)
 - /START TMEMBER ALL INPUT maximum threshold command



▪ Defining Maximum Number of TPIPEs

- The maximum number of TPIPEs for an individual OTMA client is defined on the MAXTP= parameter in the OTMA client descriptor. There is no default value.
- The maximum number of TPIPEs for ALL the clients is defined by one of the following:
 - MAXTP parameter on the OTMA client descriptor for DFSOTMA system client
 - The highest MAXTP value on any individual OTMA client descriptor (when MAXTP is not specified in the DFSOTMA descriptor)

OTMA – Dynamic Change of Descriptors

- Dynamically modify and query OTMA descriptors
 - Affect destination routing decisions
 - Without having to restart IMS to change the descriptors
 - Type-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
 - DFSYDTx member has to be manually updated with changes
 - *IMS 14 - Improved descriptor storage management*
 - *IMS 14 - Increased descriptor limits*

IMS 14

OTMA – Dynamic Change Benefits

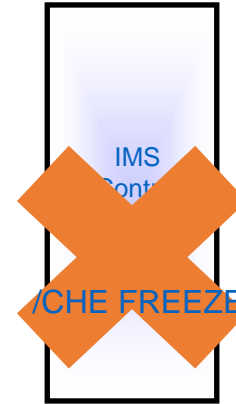
■ Benefits

- Dynamic capability to request information and monitor the OTMA Transaction Instances
 - Identify potential problems that may result in outages such as storage shortages
 - Diagnose potential problems that may arise and respond proactively to avoid or circumvent such problems
- Availability of IMS when adding, updating, or deleting descriptors
 - Provides the ability to workload-balance outbound transactions without restarting the IMS.
- Consistent command interface for OTMA by using a single point of control for commands

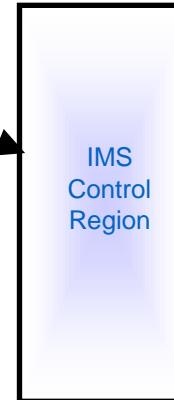
Non-dynamic OTMA Descriptor Change

1. Update OTMA Descriptor in DFSYDTx Member

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

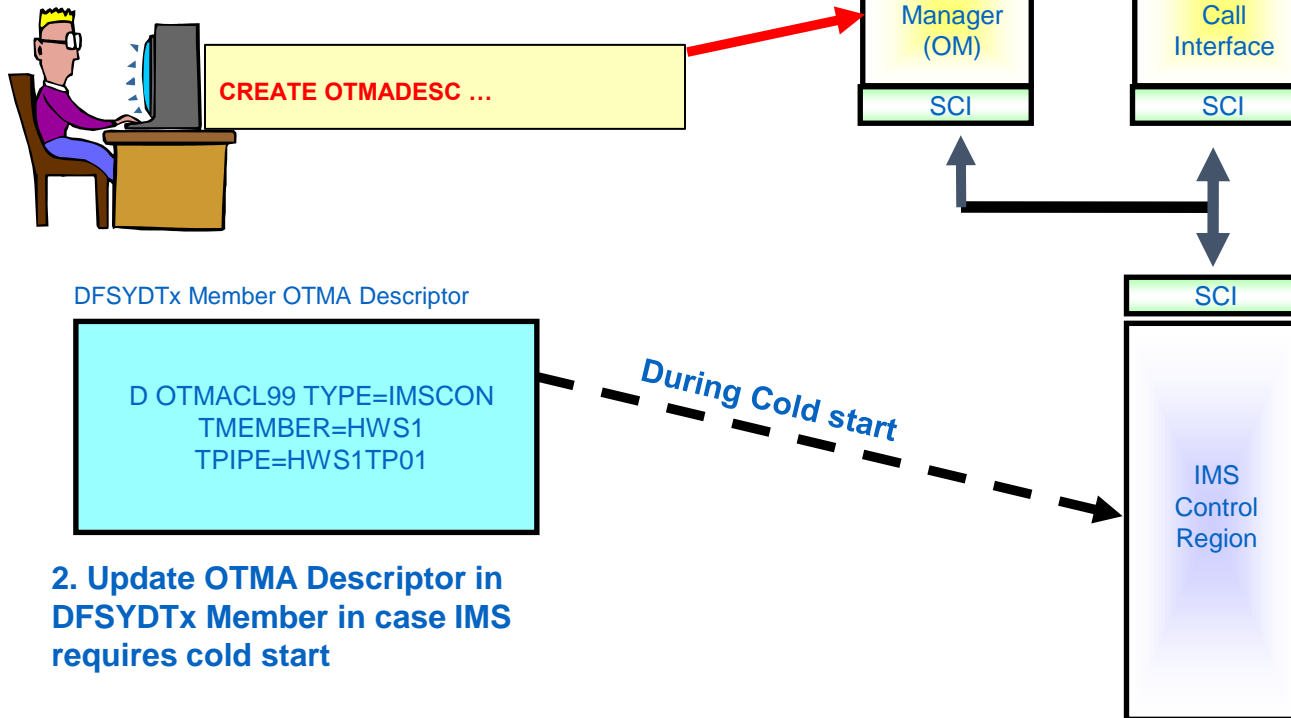


2. Restart



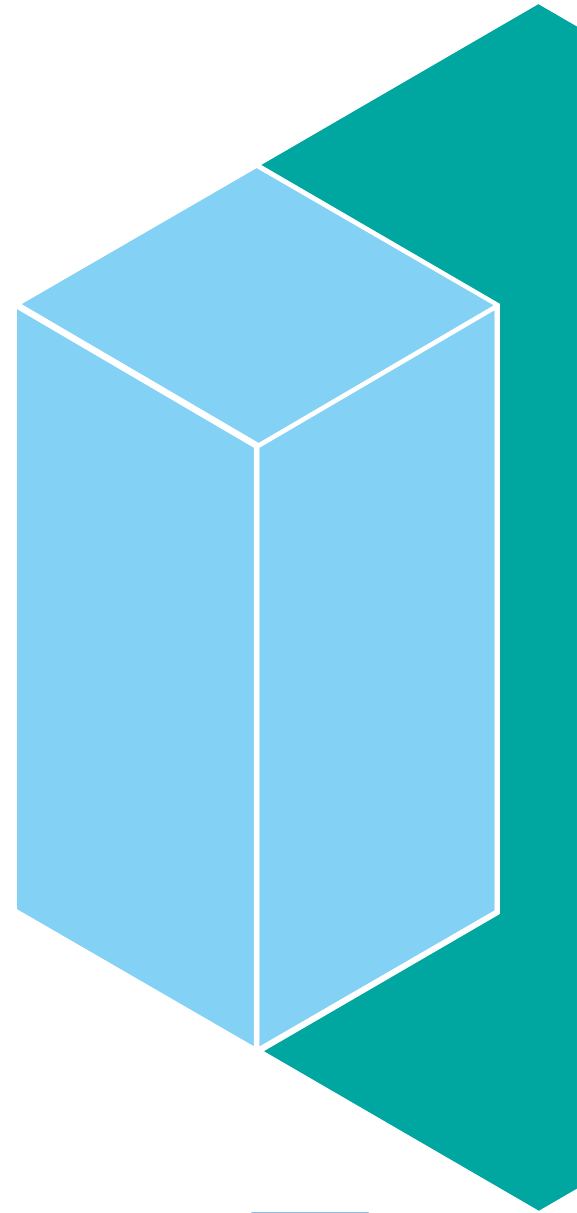
Dynamic OTMA Descriptor Change

1. Issue type-2 CREATE OTMADESC command



2. Update OTMA Descriptor in DFSYDTx Member in case IMS requires cold start

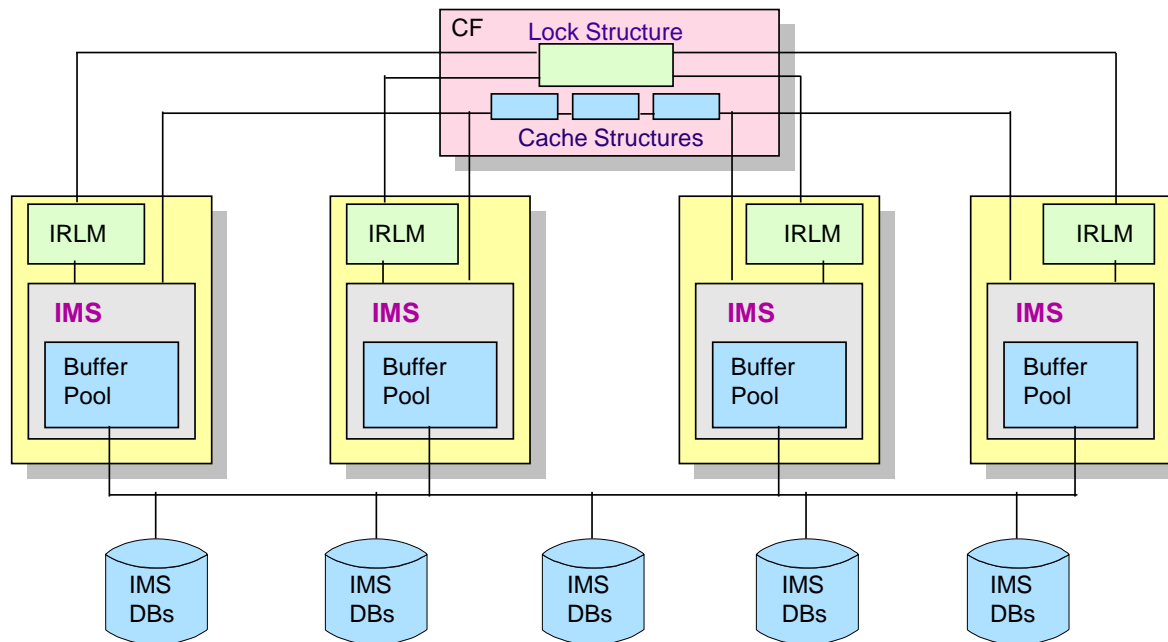
General Database



Parallel Sysplex

- High Performance Data Sharing
 - Database and/or Shared Message Queues
- Dynamic workload balancing
- Single system image
- Platform for continuous availability applications
 - Fewer planned outages
 - Redundancy for unplanned outages

Database Sharing Configuration



IMS systems include TM/DB, DBCTL, and IMS batch jobs.

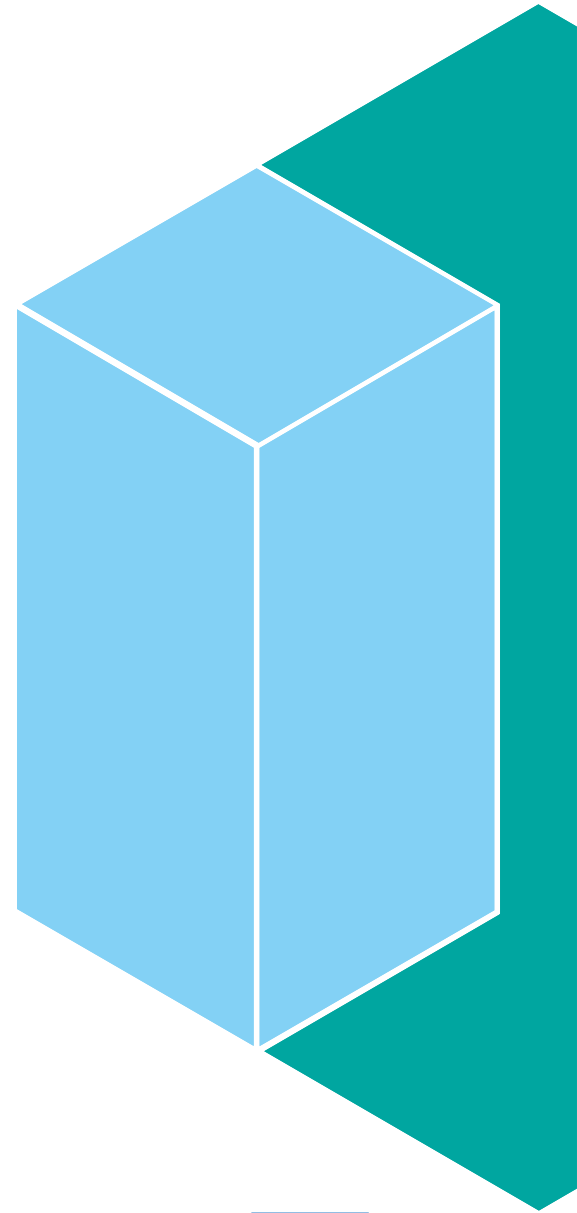
Database Quiesce

- Enhanced UPDATE command to quiesce a database or area
 - UPDATE DB ...START(QUIESCE) ... OPTION(HOLD | NOHOLD)
 - UPDATE AREA
 - UPDATE DATAGRP
- Quiesced database or area remains open and allocated
- Coordinates creation of a single common recovery point across an IMSplex
- A single IMS coordinates the quiesce when the command is routed to multiple IMS systems in an IMSplex
- Allows consistent image copy to be taken while the database or area is online
 - No /DBR or /DBD required

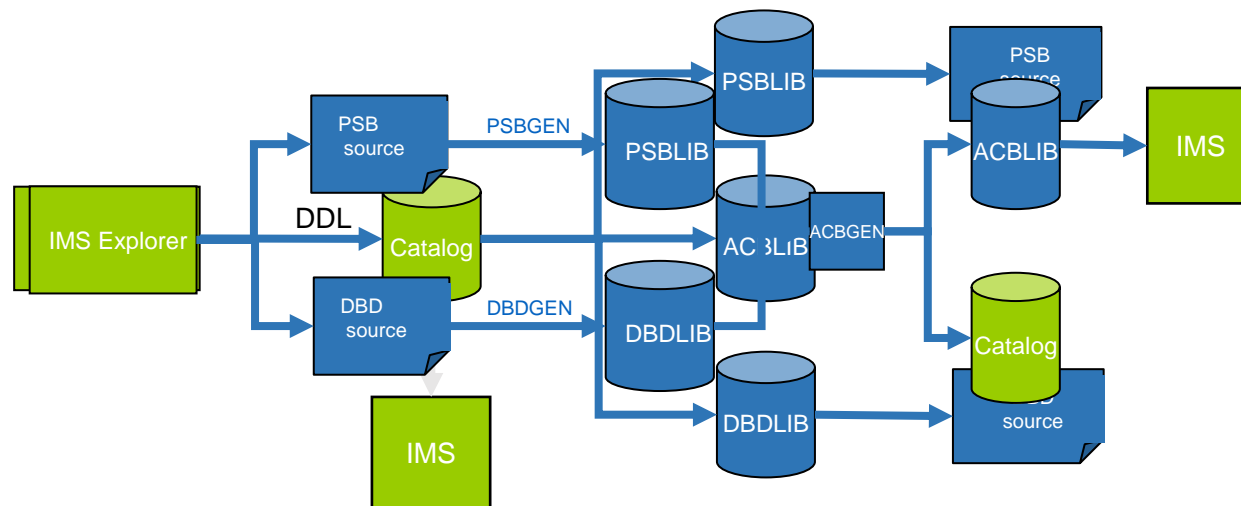
Database Versioning

- Allows application programs to use different versions of the same physical database
- Provides the ability to assign user-defined version identifiers to different versions of an IMS database structure
- Enables structural changes to a database while providing multiple views of the physical IMS data to various applications
 - Applies to **Full Function DB, HALDB, Fast Path DEDB**
 - Supports database types: **HDAM, HIDAM, PHDAM, PHIDAM, DEDB**
- Database Versioning supports the following database structure changes
 - Increasing the length of a segment
 - Adding a new field (or fields) to space at the end of a segment
- Benefits
 - Physical database structure can be changed without having to modify all the existing application programs using the database
 - Applications referencing a new physical database structure can be brought online without affecting applications that use previous database structures
 - Applications not requiring sensitivity to the new physical database structure can continue to access the database without any modifications or recompilation

DDL and Load from Catalog



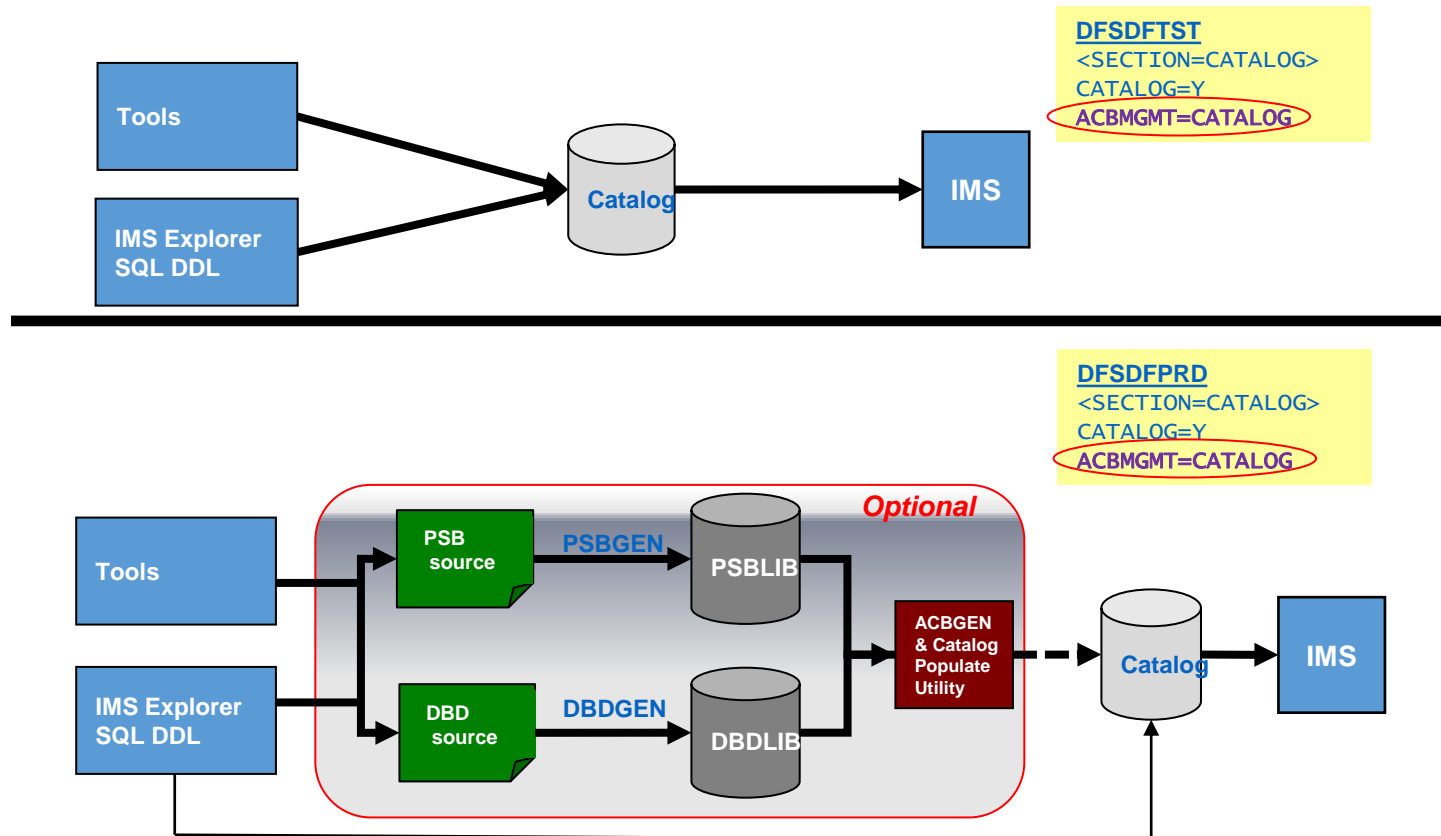
- Provides IMS customers the ability to load directly from the IMS catalog instead of the ACBLIB.
- The IMS catalog can be dynamically updated through the use of DDL from a workstation to create, alter, or delete IMS database and program resources without needing to perform a DBDGEN, PSBGEN, and ACBGEN



Replacing the ACBLIB with the IMS catalog

- To replace the ACBLIB, IMS will automatically maintain an extension in the IMS catalog called the directory.
 - The directory will consist of one or more data sets that operate similar to the ACBLIB and contain the binary runtime format of database control blocks.
 - The directory will be automatically managed by IMS when the catalog is updated.
 - Simply update the catalog, and that will trigger IMS to manage the updates to the directory.
 - A customer with a directory-enabled IMS catalog will not need to understand or manage the directory.
- The removal of the ACBLIB is optional
 - requires the customer to indicate IMS is using the catalog with a directory.

Catalog managed ACBs configurations



- Simplify database creation and modifications
- Use DDL to manipulate IMS databases and program views
 - Define
 - Modify
 - Delete
- Bypass the database generation related processes
 - DBDGEN
 - PSBGEN
 - ACBGEN
- Simplify activation of object changes in IMS
 - Some changes may be activated when committed
 - IMPORT command can activate changes w/o OLC

Dynamic Database Definition

- IMS 14 provides for using the standard DDL. IMS 14 also includes extensions specific to IMS structures to allow more detailed database definitions. These extensions closely match the current non DDL definitions used in IMS.
- Provides potential for managing several processes under a single submission
- Many options existing in the PSBGEN and DBDGEN macros are unique to IMS.
 - e.g., DB Access Types: PHIDAM, HIDAM, PHDAM, etc.
- IMS provides defaults through a template stored in the IMS catalog
- This template is based on IMS recommended defaults
 - Modifiable to user requirements
 - The recommended defaults can be seen in the syntax train tracks

DDL defaults and Enhanced IMS syntax

- Overriding the IMS system defaults
 - Enhanced DDL syntax
- All parameters that can be specified in the DBDGEN or PSBGEN macros are optional parameters in the IMS Enhanced DDL syntax
- The IMS Enhanced DDL syntax can be used with existing defaults
 - Defaults values may be overridden when specified
- DDL syntax has also been Enhanced to fully specify their PSB definitions
 - If a PSB is defined in the same commit scope as a CREATE or ALTER database call, no default PSB will be generated

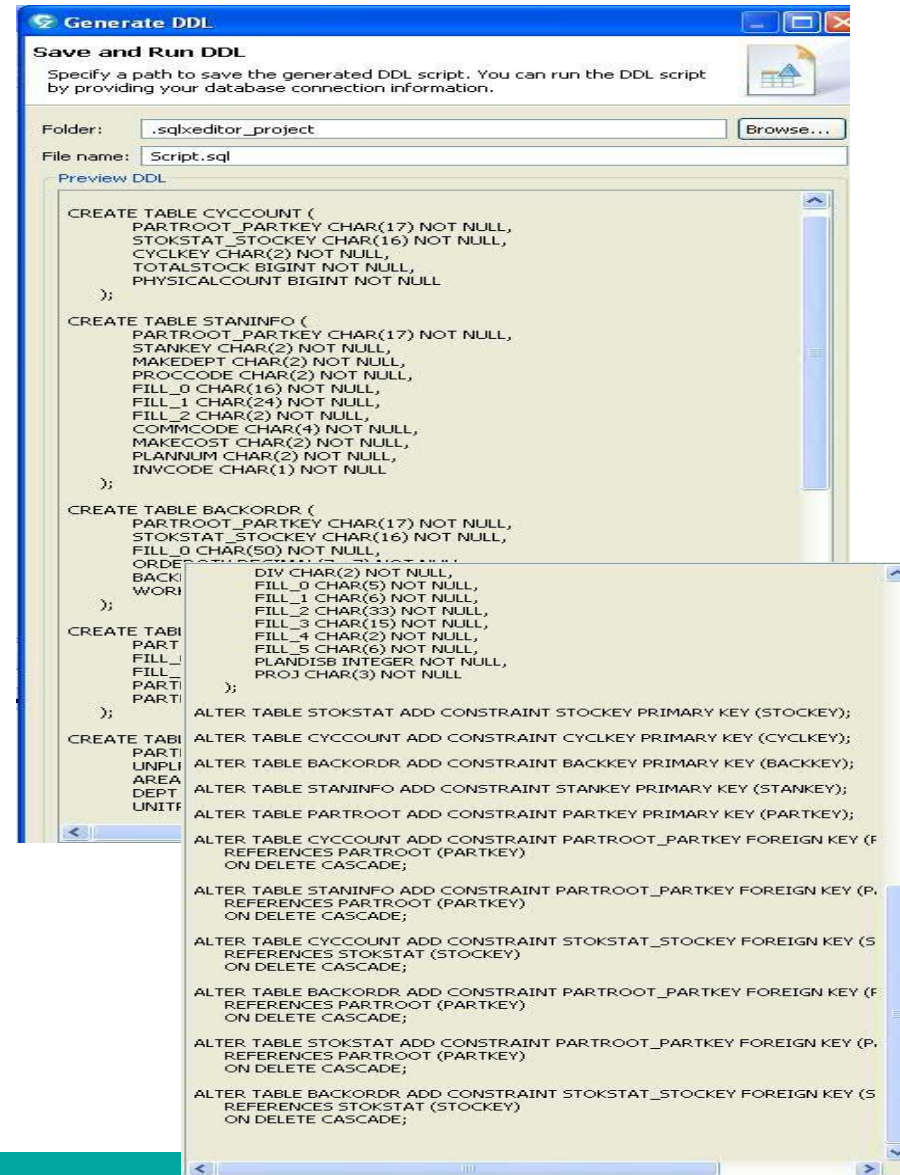
Standard DDL syntax

- Basic DDL statements
 - CREATE object
 - Define & generate
 - ALTER object
 - Redefine & regenerate
 - DROP object
 - Delete

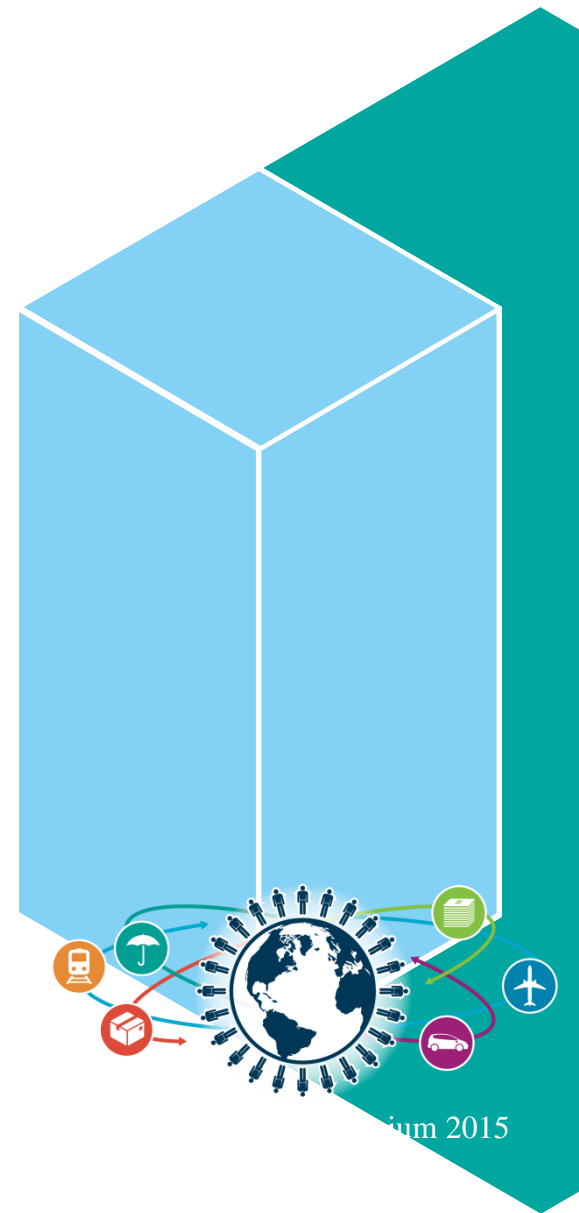
IMS	GEN statement	DDL
Database	DBD	DATABASE
Segment	SEGM	TABLE
Dataset	DATASET	TABLESPACE
Area	AREA	TABLESPACE
Program	PSBGEN	PROGRAMVIEW
PCB	PCB	SCHEMA
Senseg	SENSEG	SENSEGVIEW

Dynamic Database - Data Definition Language

- SQL incorporates DDL to modify the schema of a database
- Authoring DDL is straight-forward with sophisticated tooling support in the industry
- SQL/DDL can be used to update/add metadata in the catalog without the need of a GEN
 - Directly update the catalog
- IMS can be notified of such an update and load the new definitions



ACBLIB Management and Online Change



ACBLIB Member Online Change

- Add or Update one or more ACB members without the need to perform an online change on the entire library
 - The NAMEONLY option further reduces the impact of the OLC by only processing the ACB members named in the command
- Only the resources that are affected by the member online change are quiesced, allowing for more concurrent activity during the online change process than the current full library online change
- Provides improved availability during online change process by limiting quiesced resources to only those being changed by specified ACBs
- Complements DRD MODBLKS capability
 - Add new database definition or application definition via DRD
 - Activate associated DBDs/PSBs/ACBs via ACBLIB Member Online Change
 - In any sequence

Dynamic Allocation for ACBLIB

- Dynamic allocation of ACBLIB data sets
 - Allows the user to create DFSMDA members for the dynamic allocation of the ACBLIB data sets
 - Eliminates IMS outages in order to
 - Increase the size of the ACBLIB data sets
 - Correct errors with the inactive ACBLIB
 - Add data sets to the ACBLIB concatenation

ACBLIB Cache

- Caching of ACB members into 64-bit storage
 - Provides an option to load the ACB members into 64-bit storage
 - At application scheduling time, the ACB members are retrieved from 64-bit storage and not from the ACBLIB data set.
 - Provides a performance improvement by reducing the amount of read I/O required to the ACBLIB data set
 - Reduces need to recycle IMS to resize PSB pools

ACBLIB Member Online Change

- This capability allows the user to add or change one or more members of the ACBLIB without the need to perform an online change on the entire library
 - Does not support deletion of ACBLIB members
 - The NAMEONLY support limits the scope of MOLC
- Only the resources that are affected by the member online change are quiesced, allowing for more concurrent activity during the online change process than the current full library switch online change
- Coexists with existing full library switch online change capability
- Goal is to improve usability and availability of online change over previous IMS versions

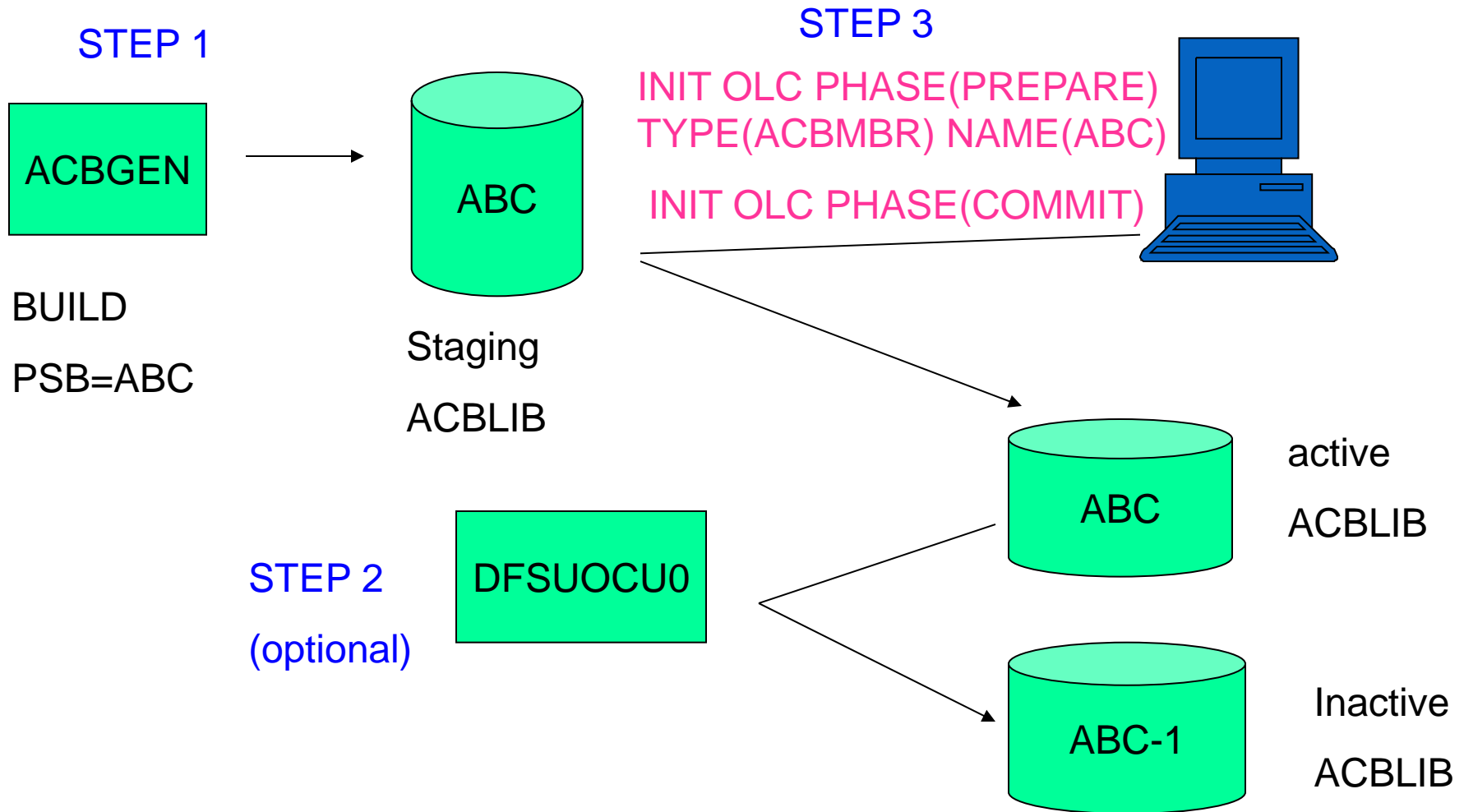
ACBLIB Member Online Change Requirements

- Uses existing IMS libraries (PSBLIB, DBDLIB, ACBLIB) and existing IMS control block generation processes (PSBGEN, DBDGEN, ACBGEN)
- Uses IMS type-2 commands only
 - INIT OLC PHASE(PREPARE) TYPE(ACBMBR) ...
- Uses staging ACBLIB as the source ACBLIB
 - Full library switch OLC uses inactive ACBLIB (copied from staging ACBLIB)

ACBLIB Member Online Change Requirements ...

- Must use OLCSTAT data set (not MODSTAT)
 - IMSplex must be using global online change
 - GOLC needs OLC=GLOBAL in DFSCGxxx or DFSDFXxx
 - Single IMS system cannot use MODSTAT
- CSL with RM required for multiple IMS systems
 - Resource structure recommended but not required
- CSL with SCI and OM required for single IMS system
 - Specify RMENV=N in DFSCGxxx or DFSDFXxx
- Coexists with existing online change ACBLIB full library switch capability
- No coexistence with previous IMS versions
 - All members in an IMSplex need to be at least at IMS V10

Process for ACBLIB Member OLC



Type 2 Commands Used with ACBLIB Member Online Change

- INITIATE OLC PHASE(PREPARE) TYPE(ACBMBR) NAME(mbrname)
- QUERY OLC SHOW(RSCLIST)
- QUERY MEMBER TYPE(IMS)
- INITIATE OLC PHASE(COMMIT)
- TERMINATE OLC

ACBLIB Member Online Change Summary

- Provides improved availability during online change process by limiting quiesced resources to only those being changed by specified ACBs
- ACBLIB member online change should be more efficient than full library switch global online change
- Complements DRD MODBLKS capability
 - Add new database definition or application definition via DRD
 - Activate associated DBDs/PSBs/ACBs via ACBLIB member online change
 - In any sequence

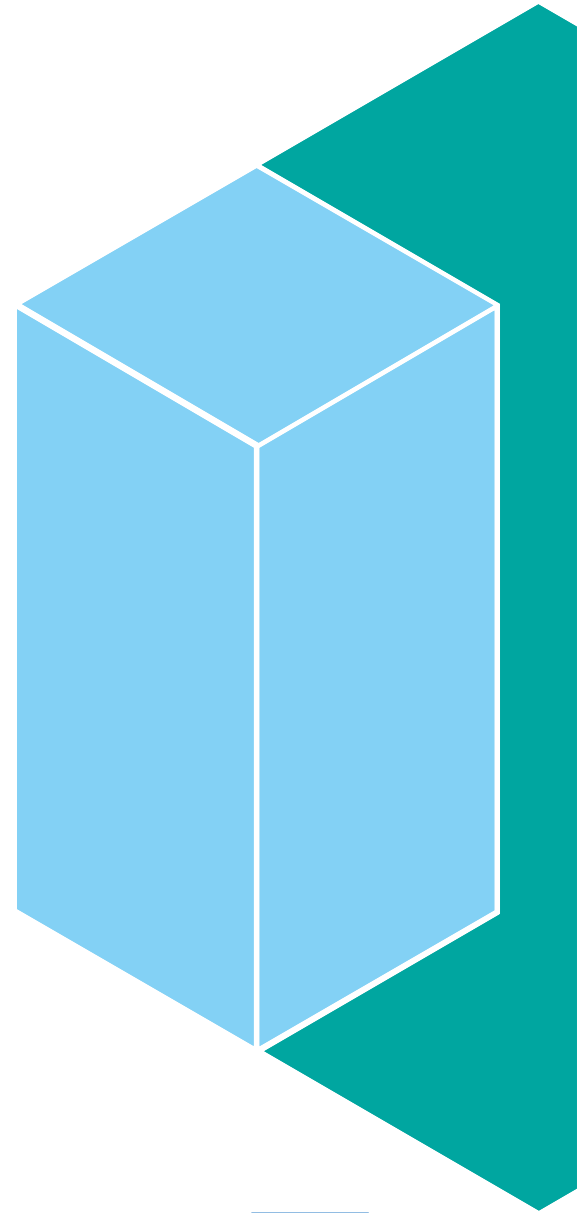
Database 'Utilities'

- Database Reorganization
 - FP *DEDB Alter*
 - HALDB Online Reorganization, *HALDB Alter*
 - IBM Tools Offering – Online Reorganization Facility
 - All offer ability to reorganize your DBs with **no or minimal outages.**
- Image Copies use of DFSMS Fast Replication
 - IMS Image Copy 2 (DFSUDMT0)
 - IBM Tools offering in IMS Recovery Solution Pack
 - Use of SLB (system level backup with IMS Recovery Expert)
 - ability to use DFSMS to create a backup of an entire IMS System
 - **Can use in conjunction with QUIESCE and HOLD to create clean image copies with minimal impact to the end user.**
- Point in Time Recovery
 - No need to create a recovery point
 - IBM Tools offering in IMS Recovery Solution Pack

Dynamic LOCKTIME

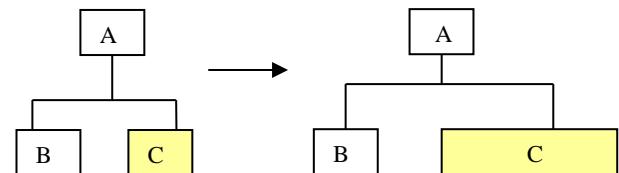
- Allows you to dynamically change the LOCKTIME value with a command
 - UPDATE IMS SET(LCLPARM (LOCKTIME(...)))
- The IMS LOCKTIME feature is used to set how long tasks will be allowed to wait on a request for a lock before being timed out
- No longer need to update the specification in DFSVSMxx and restart IMS
- Allows you to address changing contention due to periodic stress. (e.g quarterly statement processing)

Full Function DB



High Availability Large Database (HALDB) Alter

- Change the structure of an IMS HALDB without a DB outage
 - Add a new field (or fields) to space at the end of an existing segment
 - Increase the length of an existing segment
- After changes are made to segment definitions in a DBD
 - Online Reorganization process is used to alter the online database from the current structure to the new structure
 - INITIATE OLREORG NAME(masterdb) OPTION(ALTER)
 - Online Change process is used to activate the changed ACBLIB members in the IMS online system
 - Application programs can start using the new database structure
- Benefits
 - Improves IMS HALDB availability by providing structure changes without taking the database offline
 - Provides flexibility in rolling database changes into the system

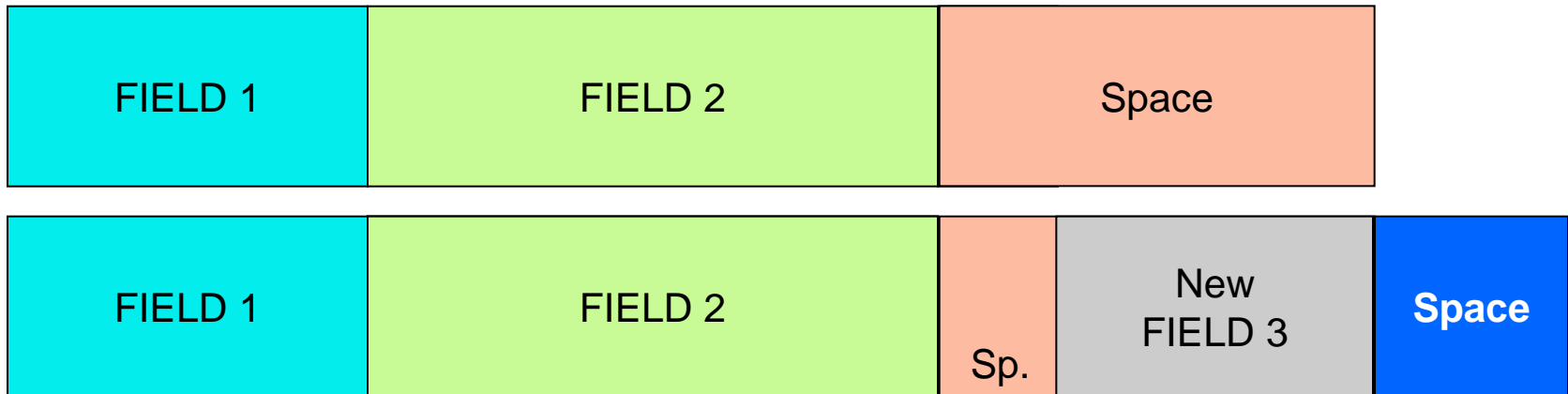


HALDB Alter - Increase the length of an existing segment

Example 1



Example 2

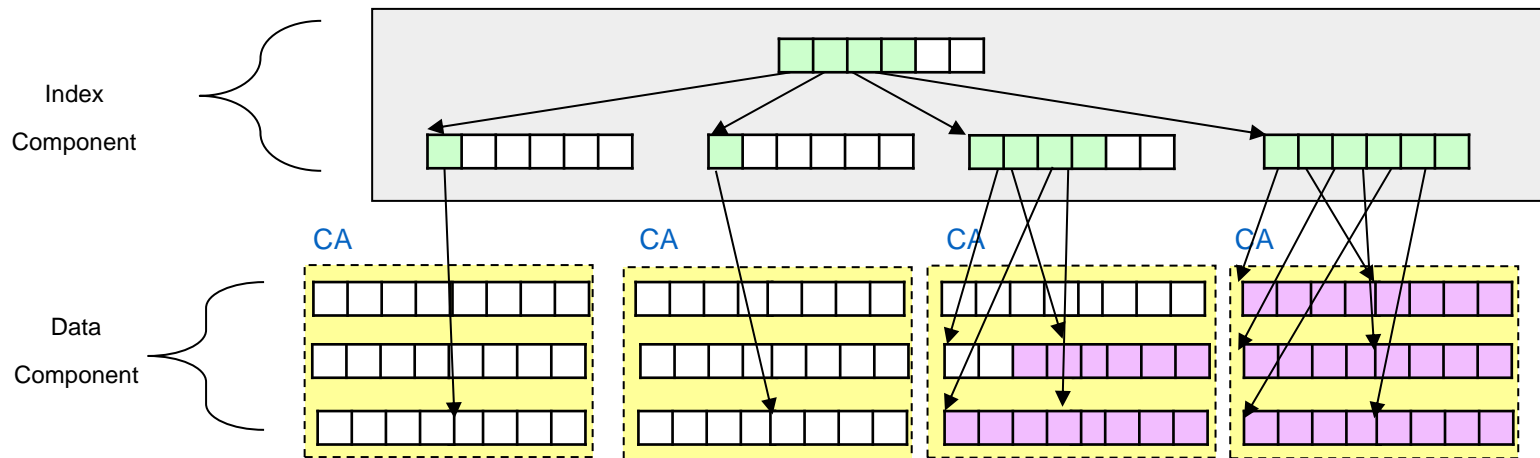


Full Function Dynamic Database Buffer Pools

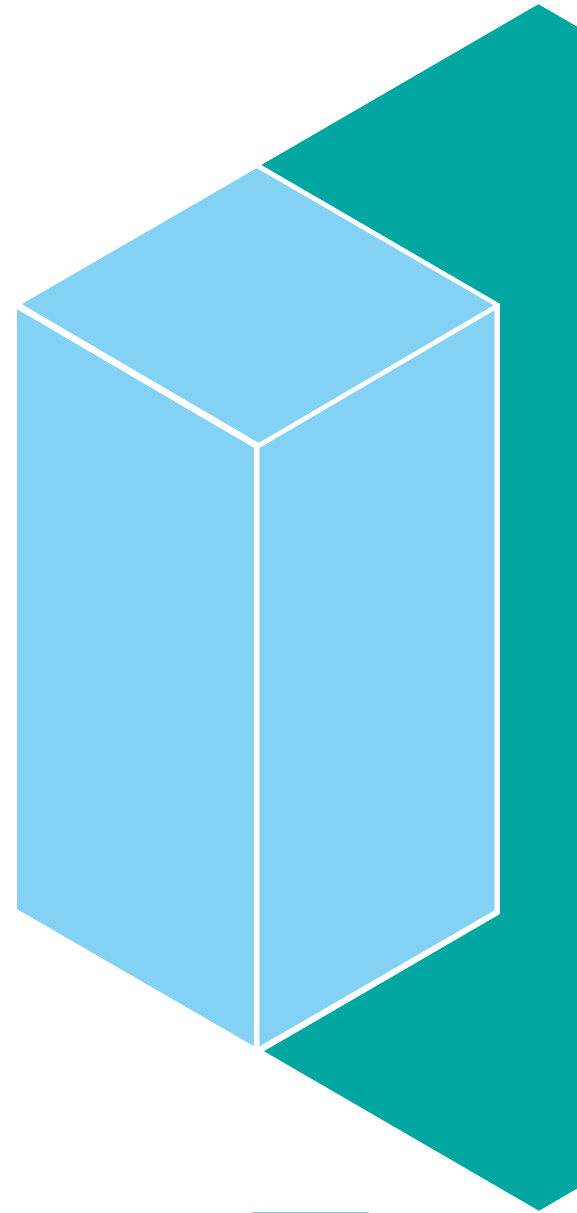
- Provide for dynamic change to an OSAM or VSAM buffer pool without recycling IMS systems to pick up the change
- Commands are used to Add, Change, or Delete FF Database Buffer Pools
 - UPDATE POOL TYPE(DBAS)
SECTION(OSAMxxx,VSAMxxx)
- Benefits
 - For buffer pool management, eliminate systems down time and improve systems availabilities
 - Flexibility with the ability to adjust DB buffers to business needs
 - Availability by being able to adjust DB buffers without stopping IMS

CA Reclaim Support

- VSAM KSDSs must be reorganized on a regular basis
 - To reclaim space previously used by deleted records
 - Deleting a range of keys can result in or “empty” CAs if the new records inserted have higher key values
 - Over time the “empty” CAs can cause performance issues due to fragmentation and extended data sets
- The problem without CA reclaim
 - Typically occurs with increasing key values and deletion of old records
 - Empty CAs cannot be reused
 - Index points to empty CAs
 - Reorganization is required to use the empty space and optimize the index
- Benefits
 - Fewer reorganizations required
 - Improved disk space usage
 - Especially useful when new keys have increasing values



Fast Path DEDB



Fast Path Data Entry Database (DEDB) Alter

- Allows dynamic change to DEDB Area without unload/reload of the area while areas remain online
 - Alter physical attributes of DEDB Area: SIZE, UOW and/or ROOT parameters
 - IMS 14 extends this support to DEDBs with SDEPs
 - Change the randomizer used for a DEDB Area
 - IMS V14 allows Areas to be dynamically added to a DEDB with or without SDEPs
 - IMS V14 allows Compression Exit Routines to be dynamically added
 - IMS V14 provides DEDB Alter support in FDBR and XRF for ACBSHR=N | Y
 - Runs as a standard Fast Path IFP utility
- Requires the use of a two-stage randomizer allowing Areas to be processed individually
- Benefits
 - Improves DEDB Area availability by providing definitional modifications without taking the Area offline
 - Improved management of DEDBs

IMS 14

DEDB Alter (ALTERAREA Function)

- ALTERAREA area_name
 - Changes UOW, SIZE, ROOT on DEDB DBD statement while DEDB online
 - SIZE
Change the CI size of an Area in a DEDB database
 - UOW and ROOT
Change the Root Addressable and Independent Overflow parts of DEDB area
 - Changes Randomizer in RMNAME DEDB DBD statement while DEDB online
 - During DEDB Alter, read active DEDB Area with old randomizer
Migrate Active Area to Target area with new randomizer
 - After DEDB Alter, new randomizer replaces old randomizer
All Areas in DEDB database use new randomizer
New name must be 2-stage randomizer
New name must be different than original name active for DEDB area
 - Only one active DEDB Area can change at a time
 - ALTERAREA does not support DEDB databases with SDEPs
 - Can replace randomizer using REPLRAND function for DEDBs with SDEPs
 - Add Segment Compression Exit in COMPRTN on SEGM statement in DEDB DBD
 - Segment/Compression Exit can only be added
Change and Delete are not allowed since they affect all DEDB Areas
 - New Segment/Compression exit is invoked for all DEDB Areas
After DEDB Alter utility reaches a successful completion

IMS 14

DEDB Alter Utility Execution (ALTERAREA)

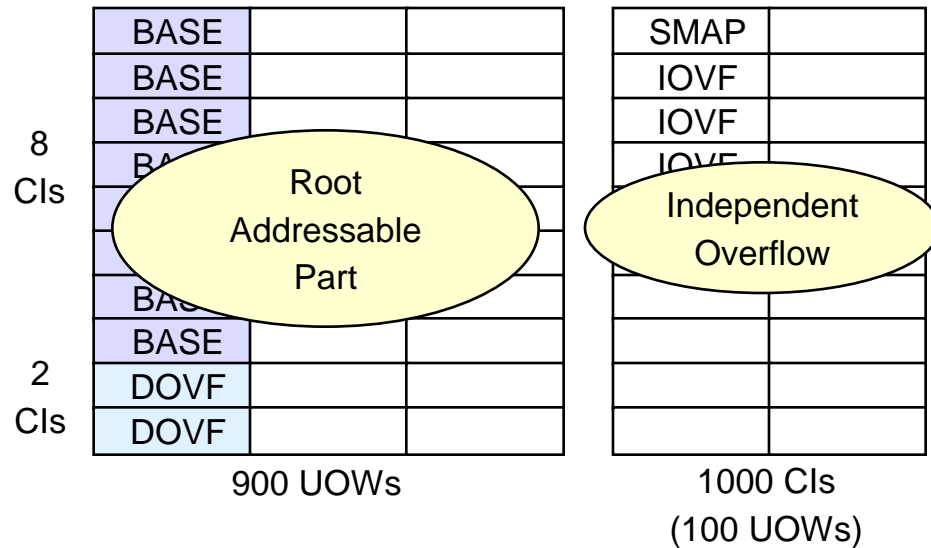
- Sample JCL: DEDB Alter Utility (ALTERAREA)

```
//ALTAREA  JOB ...
//FPUTIL   PROC   SOUT=A,RGN=1M,
//          DBD=,REST=00,DIRCA=002,
//          PRLD=,IMSID=,AGN=,SSM=,ALTID=
//FPU      EXEC   PGM=DFSRR00,REGION=&RGN,
//          PARM=(IFP,&DBD,DBF#FPU0,&REST,00,,1,
//          &DIRCA,&PRLD,0,,,,&IMSID,&AGN,&SSM,,
//          &ALTID)
//STEPLIB  DD   DSN=IMS.CRESLIB,DISP=SHR
//PROCLIB  DD   DSN=IMSVS.PROCLIB,DISP=SHR
//SYSPRINT DD   SYSOUT=&SOUT
//SYSUDUMP DD   SYSOUT=&SOUT,...
//S0       EXEC  FPUTIL,RGN=1M,DBD=DEDBJN21,REST=00,IMSID=IMS1
//SYSIN    DD   *
TYPE       ALTER
ALTERAREA  DB21AR0
RETRY      NO
TIMEOUT    30
GO
/*
```

DEDB Alter Utility Execution (ALTERAREA)

- **Complete preparation steps:**
 - Alter DEDB DBD, run DBDGEN, run ACBGEN
 - Allocate Shadow Area and Shadow IC data sets, Register and Format
- **Execute DEDB Alter Utility (ALTERAREA)**
 - A. Data is migrated from active DEDB Area to Shadow Area and Shadow IC
 - Uses new UOW, ROOT and SIZE parms in staging ACBLIB
 - Use current randomizer to read Active DEDB Area
 - Use new randomizer (if changing) to insert to Shadow Area data set
 - B. Commits new randomizer and/or UOW, ROOT and SIZE changes
 - 1. Active DEDB Area is quiesced and DL/I calls are suspended
 - 2. Shadow Area data set is synchronized with Active DEDB Area
 - 3. Changed ACB in the Staging ACBLIB is moved to the Active ACBLIB
 - New randomizer replaces existing randomizer (if changed)*
 - 4. Shadow Area data set becomes new DEDB Area data set
 - Original DEDB Area data set is preserved*
 - 5. Un-Quiesce DEDB Area and resume suspended DL/I calls

DEDB Alter Example (ALTERAREA)

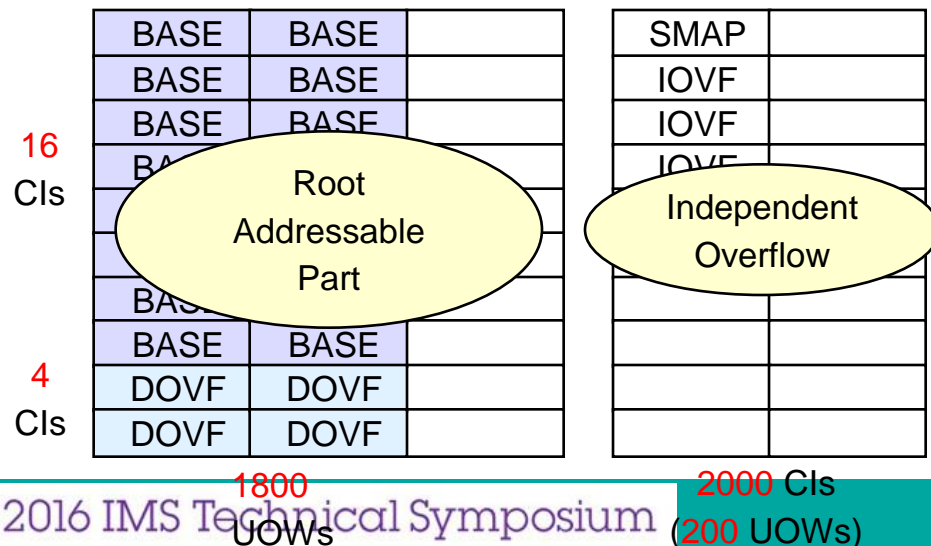


DBD NAME=FPDEDB,ACCESS=DEDB,RMNAME=DEDBRAND
 AREA DD1=AREA1,...
 AREA DD1=AREA2,SIZE=4096,UOW=(10,2),ROOT=(1000,100)
 AREA DD1=AREA3,...

ALTERAREA

UOW = (20,4)

ROOT = (2000,200)



DBD NAME=FPDEDB,ACCESS=DEDB,RMNAME=DEDBRAND
 AREA DD1=AREA1,...
 AREA DD1=AREA2,SIZE=4096,UOW=(20,4),ROOT=(2000,200)
 AREA DD1=AREA3,...

Post-DEDB Alter Utility Execution

- If DEDB Alter is Successful

- Shadow Area data set is promoted to Active Area data set
 - Old active area data set is demoted to SHADOW area data set
- Shadow IC data set is promoted to user Image Copy
 - Registered in DBRC as “user image copy”

Counted as user image copy in GENMAX value

- Not a standard image copy

Instead, it is an image of Active Area data set

- To recover the Area with this image copy

(1) Notify DBRC that Area was restored

NOTIFY.RECOV DBD(name) AREA(name) RCVTIME(time_stamp)

time_stamp = Time when SHADOW IC was created by DEDB Alter utility

(2) Issue GENJCL.RECOV with no image copy

GENJCL.RECOV DBD(name) AREA(name) USEAREA

- ADDAREA area_name
 - Allows one or more AREA statements to be added to end of DEDB DBD
 - Define the order and Area names in AREA Statement
 - Changes Randomizer in RMNAME DEDB DBD statement
 - During DEDB Alter, read active DEDB Area with old randomizer
Migrate Active Area to Target area with new randomizer
 - After DEDB Alter, new randomizer replaces old randomizer
All Areas in DEDB database use new randomizer
New name must be 2-stage randomizer
New name must be different than original name active for DEDB area
 - Adds Seg/Compression Exit in COMPRTN on SEGM statement in DEDB DBD
 - Segment/Compression Exit can only be added
Change and Delete are not allowed since they affect all DEDB Areas
 - New Segment/Compression exit is invoked for all DEDB Areas

DEDB Alter Utility Execution (ADDAREA)

- Complete preparation steps (New in IMS V14)
 - Assemble and Linkedit new Randomizer (if changed)
 - Assemble and Linkedit new Segment Edit / Compression Exit (if changed)
 - Alter DEDB DBD definitions
- Allocate new ACTIVE DEDB Area data sets
- Register and Format ACTIVE DEDB Area data sets

DEDB Alter Utility Execution (ADDAREA)

- Execute DEDB Alter Utility (ADDAREA) (New in IMS V14)
 - A. Data is migrated from active DEDB Area to Shadow Area
 - Use new AREA definitions from Staging ACBLIB
 - Use current randomizer to read Active DEDB Area
 - Use new randomizer (if changed) to insert to Shadow Area data set
 - Use new segment/compression exit in Shadow Area data set (if added)
 - B. Commits new Areas, Randomizer and/or Segment/Compression Exit
 1. Active DEDB Area is quiesced and DL/I calls are suspended
 2. Shadow Area data set is synchronized with Active DEDB Area
 3. Changed ACB in the Staging ACBLIB is moved to the Active ACBLIB
 - New randomizer replaces existing randomizer (if changed)
 - New Segment/Compression Exit is included (if added) (New in IMS V14)
 4. Shadow Area data set becomes new DEDB Area data set
 5. Un-Quiesce DEDB Area and resume suspended DL/I calls

Post-DEDB Alter Utility Execution (ADDAREA)

- If DEDB Alter is Successful
 - Shadow Area data set is promoted to Active Area data set
 - Old active area data set is demoted to SHADOW area data set
- If DEDB Alter is Unsuccessful
 - Active Area data sets remain active and accessible to IMS systems
 - Shadow Area data sets remain active and accessible to IMS systems

DEDB Alter (REPLRAND Function)

▪ REPLRAND

- Changes Randomizer in RMNAME DEDB DBD statement while DEDB online
 - New name must be 2-stage randomizer
 - Existing randomizer must be a 2-stage randomizer
 - New name must be different than original name active for DEDB area
 - After DEDB Alter, new randomizer replaces old randomizer
All Areas in DEDB database use new randomizer
- Supports DEDB database with or without SDEPs

DEDB Alter Utility Execution (REPLRAND)

- Complete preparation steps:
 - Assemble and linkedit new randomizer
 - Modify DEDB DBD with new randomizer, run DBDGEN, run ACBGEN
- Execute DEDB Alter Utility (REPLRAND)
 - A. Load the new randomizer from IMS SDFSRESL STEPLIB concatenation
 - B. Load the new ACB from the Staging ACBLIB.
 - C. Commits new randomizer change
 1. Active DEDB database is quiesced causing DL/I calls are suspended
 2. Changed ACB in the Staging ACBLIB is moved to the Active ACBLIB
 3. DEDB database is un-quiesced and suspended DL/I calls are resumed

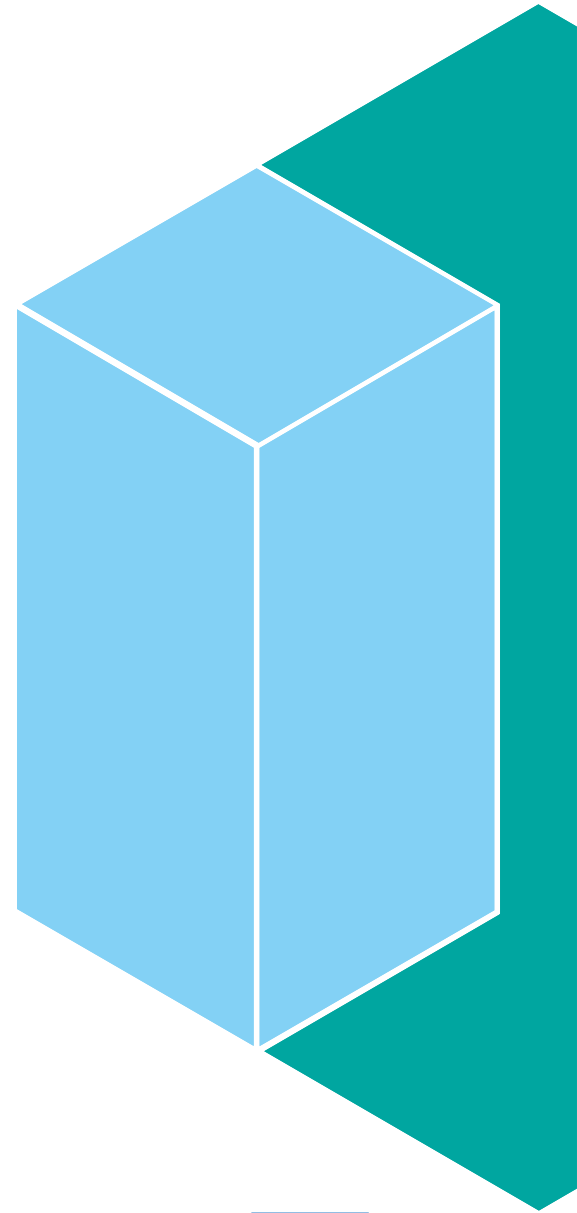
Fast Path 64 Bit Buffer Manager

- Fast Path buffers moved above the 2GB bar in control region address space
 - Multiple subpools with different buffer sizes
 - Subpools expand and compress
 - Enabled through parameters in DFSDFxxx PROCLIB member
 - Default maintains buffers in ECSA (FPBP64=N)
 - Changing to 64-bit buffers requires a cold start of IMS
 - User does not specify the number of buffers

DBBF, BSIZ, and DBFX are ignored when FPBP64=Y is specified

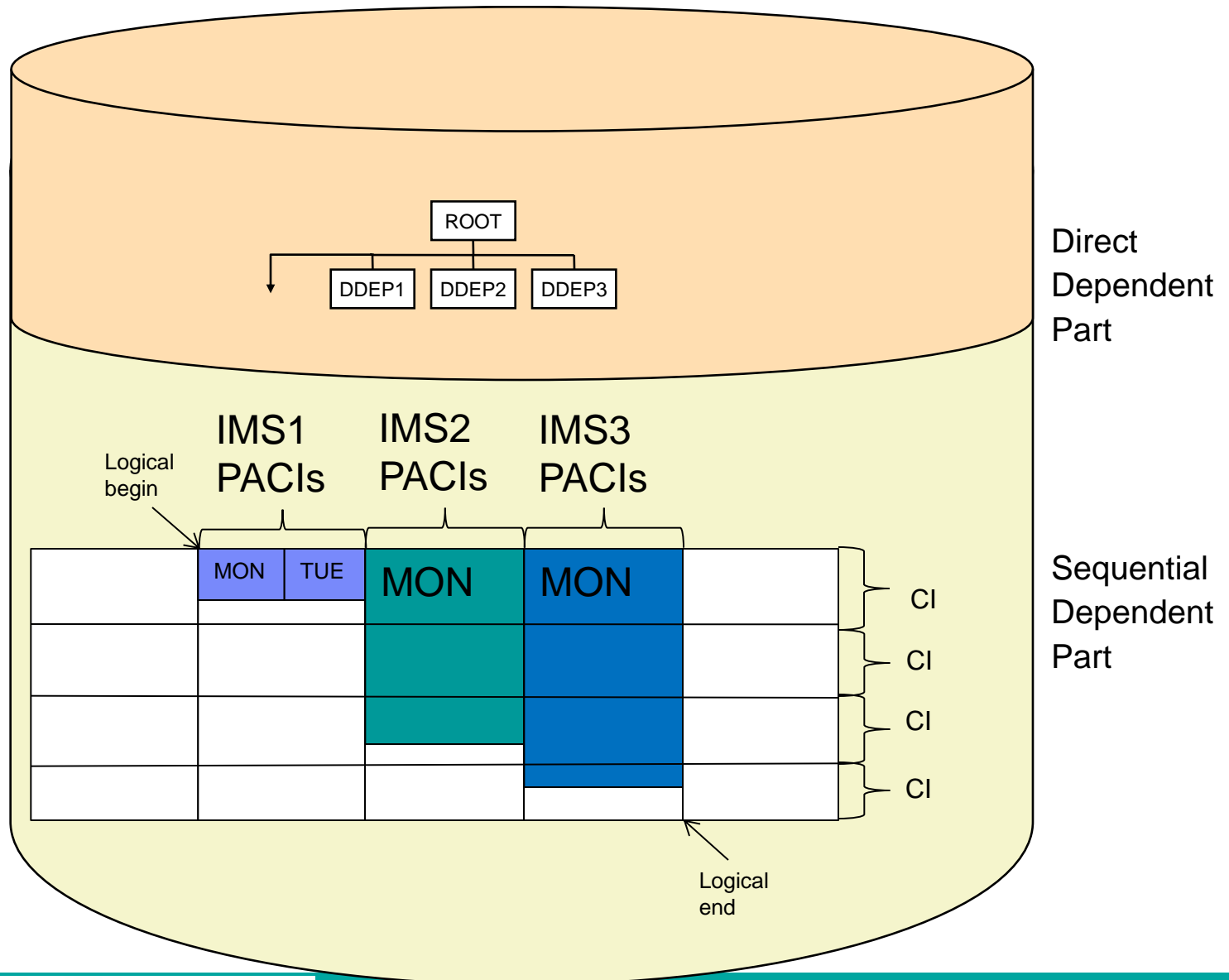
- Benefits
 - ECSA constraint relief
 - Can eliminates U1011 abends due to ECSA fragmentation
 - Self tuning
 - IMS automatically allocates and manages the subpools
 - User does not specify the number of buffers
 - Supports multiple buffer sizes
 - Better use of buffers when using areas with different CI sizes
 - **IMS restart is not required to add more Fast Path buffers**
 - New dependent regions or threads may be added
- New regions or threads may have higher NBA and/or OBA values*

Automated SDEP Buffer Management



- An imbalance in workload among IMSs that are sharing SDEPs can prevent SDEPs CIs from being physically deleted and fill up an area. Users may be unable to physically delete specified SDEP CIs because of low activity IMSs
 - The current SDEP CI and the other preallocated CIs for the current IMS
- IMS 14 allows SDEP CIs to be automatically cleaned up on a regular basis
- Benefit
 - Allow the Logical Begin RBA advance in order to free up SDEP CI space by the next DLET job
 - Reduce the physical delete lag from logical delete
 - Automate manual processes associated with SDEP processing
 - Reduce manual or Automated Operations monitoring of SDEP usage
 - Eliminate the need to /DBR an area in order to flush the SDEPs CIs

Example



Automated SDEP Buffer Management

- SDEP CIs may be unable to be physically deleted because of low activity IMSs.
 - Potential performance impact
 - A shortage of available SDEP storage
- Tasks unable to be performed currently
 - Physically advance the Logical Begin RBA to free up space for SDEPs.
 - Eliminate how physical delete lags from logical delete.

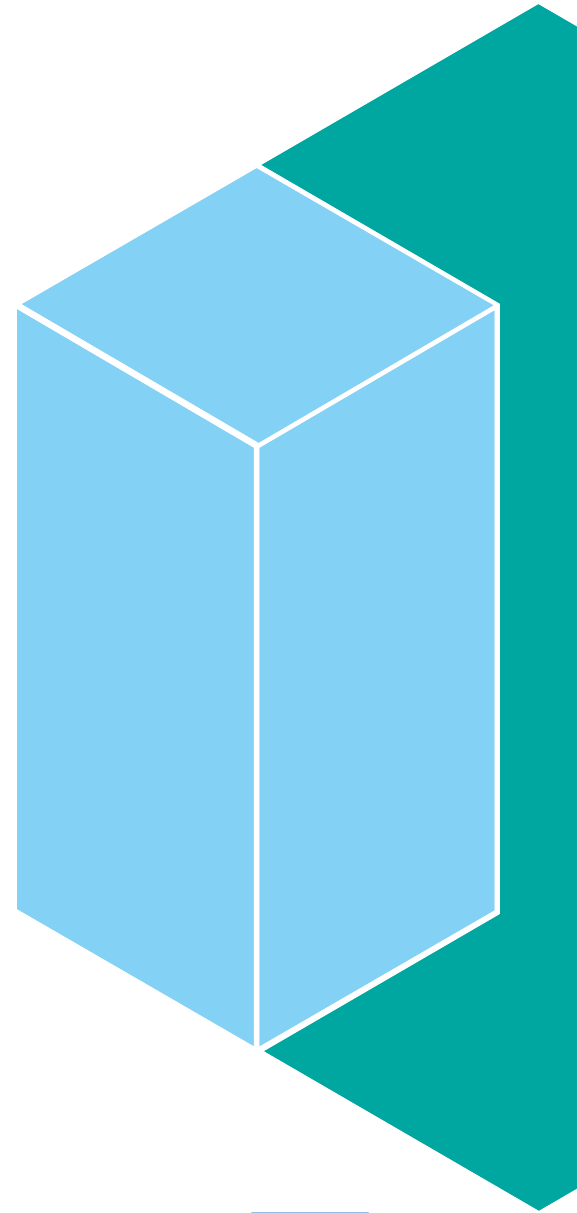
Automated SDEP Buffer Management

- SDEP Buffer clean up will happen automatically
- A QUITCI process will be done automatically
- Each sharing IMS will clean up their own SDEP CIs
- Messages are issued every time clean up is performed to indicate the start and end of the process
- Cleaned up SDEP CIs has the same log records as other IMS processes performing a QUITCI

Restrictions

- Area must be online
 - not be /DBR'd, /DBD'd or UPDATE with STOP(*nnnnn*)
- Buffer management will only occur when there are no utilities are running against an Area.

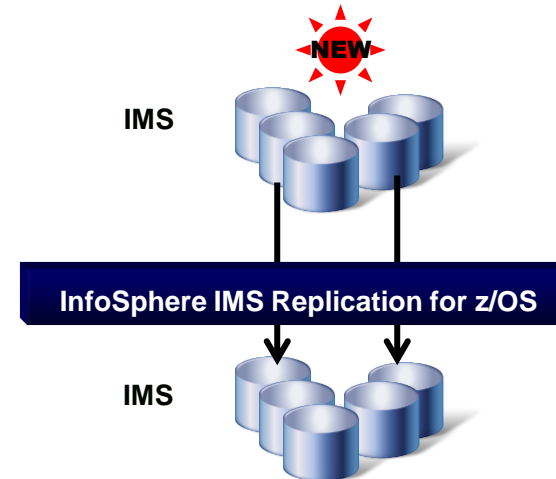
Multi-site Availability



IMS Software-Based Data Mirroring

InfoSphere IMS Replication

- Unidirectional Replication of IMS data
 - All or nothing at DB level
 - Conflicts will be detected
 - Manual resolution will be required
 - External initial load of target DB
 - Basic replication monitoring
 - TCP/IP for data transmission
- IMS “Capture”
 - DB/TM, DBCTL, Batch DL/I
 - Capture x'99' log records
 - Increase in log volume due to change data capture records
- IMS “Apply”
 - Uses IMS Database Resource Adapter interface
 - Serialization based on resources updated by unit of recovery
 - Uses bookmark DB for restart support
- Administration via Classic Data Architect & z/OS console commands



The GDPS “Family”



Continuous Availability of Data within a Data Center	Continuous Availability w/ Disaster Recovery within a Metropolitan Region	Disaster Recovery at Extended Distance	Regional Continuous Availability w/ Disaster Recovery @ Extended Distance	Continuous Availability, Disaster Recovery, and Cross-site Workload Balancing at Extended Distance
GDPS/HyperSwap Mgr	GDPS/PPRC	GDPS/GM & GDPS/XRC	GDPS/MGM & GDPS/MzGM	GDPS Active-Active Sites
RPO = 0 / RTO = 0	RPO = 0 / RTO <1hr (>20 km) RPO = 0 / RTO = 0 (<20 km)	RPO secs / RTO <1 hr		RPO seconds / RTO seconds
Single Data Center Applications remain active	Two Data Centers Systems remain active	Two Data Centers Rapid Systems Disaster Recovery with “seconds” of Data Loss	Three Data Centers High availability for site disasters	Two or More Data Centers
Continuous access to data in the event of a storage subsystem outage	Multi-site workloads can withstand site and/or storage failures	Disaster recovery for out of region interruptions	Disaster recovery for regional disasters	All sites active
Components Tivoli – NetView, SAz System z, DS8K, PPRC GDPS control code, Services	Tivoli – NV, SAz, SA-MP, AppMan System z, DS8K, VTS, PPRC GDPS control code, Services	Tivoli – NV, SAz System z, DS8K, Global Mirror, XRC GDPS control code, Services	Tivoli – NV, SAz System z, DS8K, MGM, MzGM GDPS control code, Services	Tivoli – SA, NetView Multi-site Workload Lifeline DB2 & IMS replication System z, DS8K, Global Copy GDPS control code, Services

Thank You

