

E54

V8 Resource Manager/Coordinated Online Change

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User Requirements

- Systems management of resources in a sysplex becomes more difficult as you add IMSs
- Resource state should be resumed, if logging onto another IMS with VTAM generic resources
- Resource name and type need to be consistent across IMSplex using shared queues (Iterms, trans, etc)
- Single resource instance needs to be enforced for Iterms, nodes, and users
- Online change needs to be coordinated

Common Service Layer (CSL)

- Set of IMS address spaces, built on BPE, which provide infrastructure for systems management
- Operations Manager (OM)
 - ▶ IMSplex-wide command entry and response
- Resource Manager (RM)
 - ▶ Global resource management
 - ▶ IMSplex-wide process management
- Structured Call Interface (SCI)
 - ▶ IMSplex member registration and authorization
 - ▶ Communications between IMSplex members

IMSplex

- Collection of one or more IMS address spaces that work together and typically:
 - ▶ Share databases, resources, or messages (or any combination)
 - ▶ Runs in a S/390 or z/OS sysplex environment
 - ▶ Includes a Common Service Layer

IMSplex Components

- IMS address spaces that include:
 - ▶ Control region address spaces
 - IMS DB/DC, DBCTL, DCCTL
 - ▶ CSL address spaces
 - OM, RM, SCI
 - ▶ IMS service address spaces
 - CQS, DBRC
 - ▶ Single Point of Control address spaces
 - TSO SPOC
 - IMS Connect (for IMS Control Center)
- Vendor or customer address spaces that register to SCI

Resource Manager (RM)...

- Manages global resource information on a resource structure on behalf of clients
- Coordinates IMSplex-wide processes on behalf of clients
- Supports an API for clients provided by CSLRMxxx assembler macros
 - ▶ Installation may wish to exploit RM API to share their own global resources or IMSplex-wide processes
- Supports users exits for monitoring and tailoring RM

Resource Manager (RM)

- Is exploited by IMS for the following:
 - ▶ Resource type consistency
 - transaction on one IMS cannot be defined as lterm on another
 - enabled if a resource structure is defined
 - ▶ Sysplex Terminal Management (STM)
 - resource status (global terminal and user info)
 - user can logon to another IMS with VTAM generic resources and resume user state
 - name uniqueness
 - single active lterm, single signed on user
 - ▶ Global Online Change

RM Client Interface

- Provided by CSLRMxxx assembler macros to manage global resources & processes
 - ▶ CSLRMDEL - delete resource
 - ▶ CSLRMDRG - deregister client
 - ▶ CSLRMPRI - process initiate
 - ▶ CSLRMPRR - process step response
 - ▶ CSLRMPRS - process step
 - ▶ CSLRMPRT - process terminate
 - ▶ CSLRMQRY - query resource
 - ▶ CSLRMREG - register client
 - ▶ CSLRMUPD - create/update resource

RM User Exits

- RM client connection user exit
 - ▶ Called for events including client register and client deregister
- BPE initialization/termination user exit (RM)
 - ▶ Called for events including RM initialization, RM termination, IMSplex initialization, IMSplex termination
- BPE statistics user exit (RM)
 - ▶ Driven by a timer to provide RM statistics

RM Resource Structure

- CQS coupling facility (CF) list structure used by RM to manage resources & processes
 - ▶ Required for Sysplex Terminal Management
 - ▶ Optional for Global Online Change (but recommended)
- Resource structures support the following:
 - ▶ CF duplexing
 - ▶ System-managed rebuild
 - ▶ CQS structure copy
 - ▶ Structure alter (manual and automatic)
 - ▶ Structure full threshold monitoring
 - ▶ Structure repopulation

Sizing a structure

- MVS provides web-based tool called CFSIZER to help you size your CF list structures

<http://www-1.ibm.com/servers/eserver/zseries/cfsizer/>

- ▶ Select IMS
- ▶ Provide input to size IMS structures such as
 - Resource structure
 - MSGQ structure
 - EMHQ structure
- ▶ Help available to help you size your structure

QUERY STRUCTURE command

- Displays structure information
 - ▶ Structure name
 - ▶ Structure type (resource)
 - ▶ List entries allocated and in use
 - ▶ Data elements allocated and in use
 - ▶ List entry to data element ratio
- Example

TSO Input:

```
QUERY STRUCTURE SHOW (STATISTICS)
```

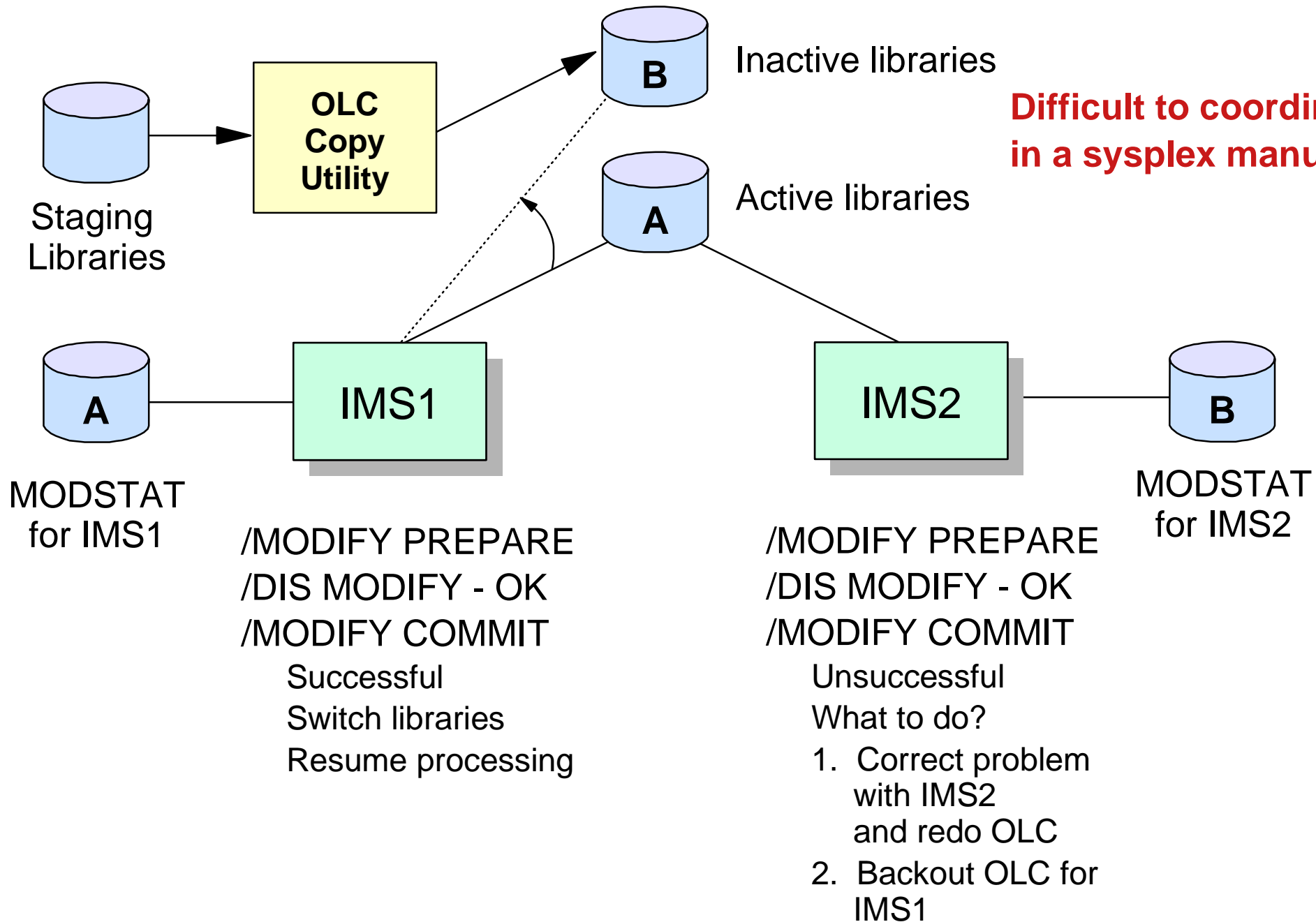
TSO Output:

StructureName	MbrName	CC	LeAlloc	LeInuse	ElmAlloc	ElmInuse	LE/EL
IMSRSRC01	RM1RM	0	3577	680	3574	32	0001/00001

Online Change

- IMS function to change resources online on one IMS
 - ▶ DMBs in ACBLIB, databases, MFS formats, PSBs in ACBLIB, programs, routing codes, security matrices, transactions
- Offline preparation
 - ▶ MODBLKS gen, DBDGEN, PSBGEN, ACBGEN, MFS format utility
- Online change copy utility (OLCUTL)
 - ▶ copies staging library to inactive library
- Online change prepare command
- Online change commit command

Local Online Change



Global Online Change...

- Optional function that coordinates existing online change function for all the IMSs in the IMSplex (a.k.a. Coordinated Online Change)
 - ▶ IMS uses RM to coordinate online change prepare, commit, and abort phases
- OLCSTAT dataset contains global online change status
 - ▶ dynamically allocated dataset
 - ▶ shared by IMSs in IMSplex
- Global Online Change Utility (DFSUOLC0) initializes OLCSTAT dataset

Global Online Change

- One INITIATE OLC PHASE(PREPARE) command coordinates the online change prepare phase on all IMSs
- One INITIATE OLC PHASE(COMMIT) command coordinates the online change commit phase 1, commit phase 2, and commit phase 3 on all IMSs
 - ▶ OLCSTAT dataset updated after all IMSs have completed commit phase 1
- One TERMINATE OLC command coordinates the online change abort phase on all IMSs

Global Online Change Benefits

- IMSplex commands
 - ▶ One INITIATE or TERMINATE command to perform an online change phase
 - ▶ Meaningful responses from each IMS including completion code and error text (if applicable)
 - ▶ QUERY MEMBER command displays online change state
- Prevents situation where online change committed on some IMSs, not committed on others
- Simplifies error handling
 - ▶ INIT OLC to retry or TERM OLC to abort

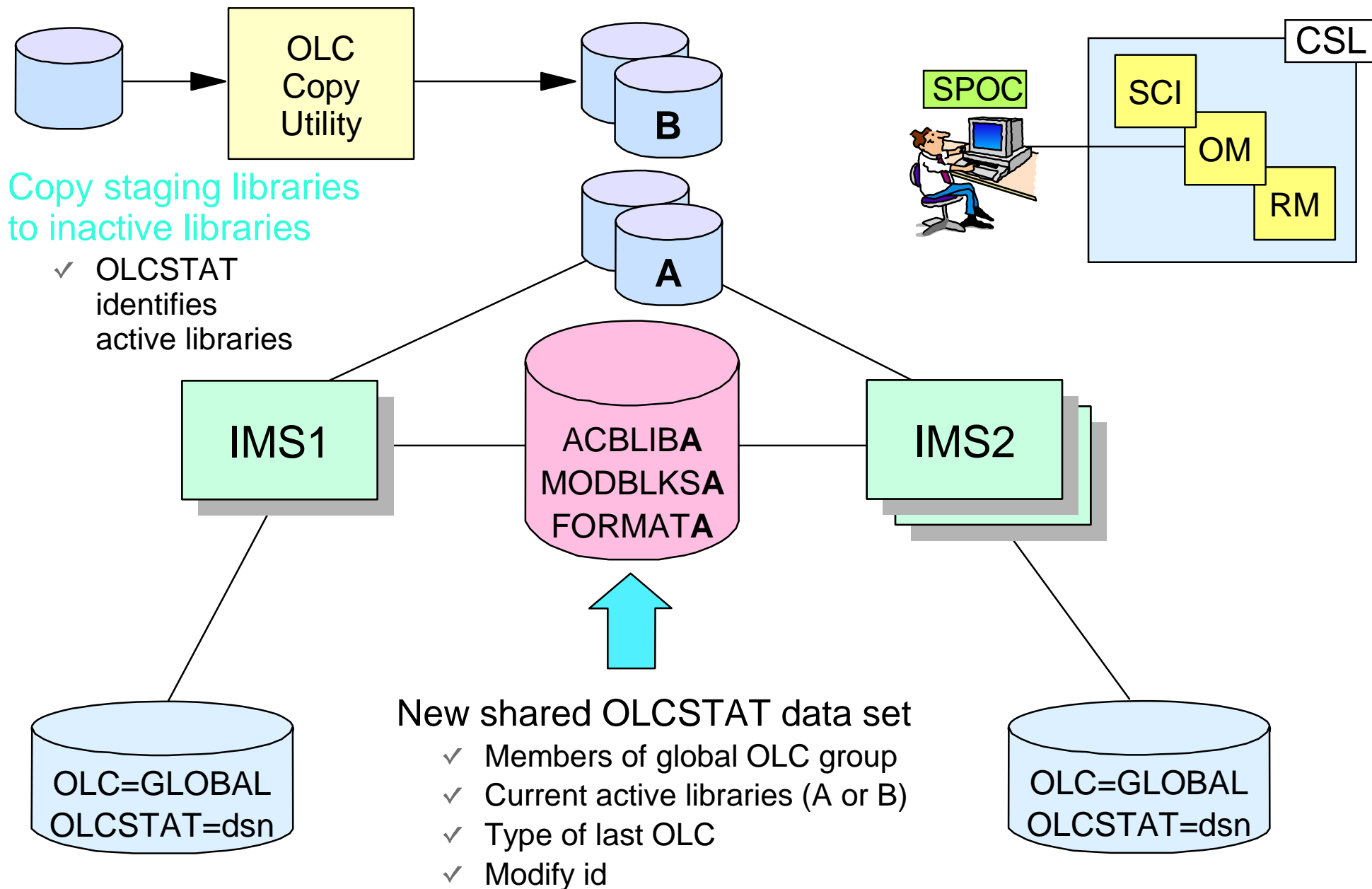
OLCUTL utility

- Existing online change copy utility to copy staging library to inactive library
- OLCSTAT DD statement support added for global online change
- OUT=G parameter support added, to specify that the target library is the inactive library determined from the OLCSTAT dataset

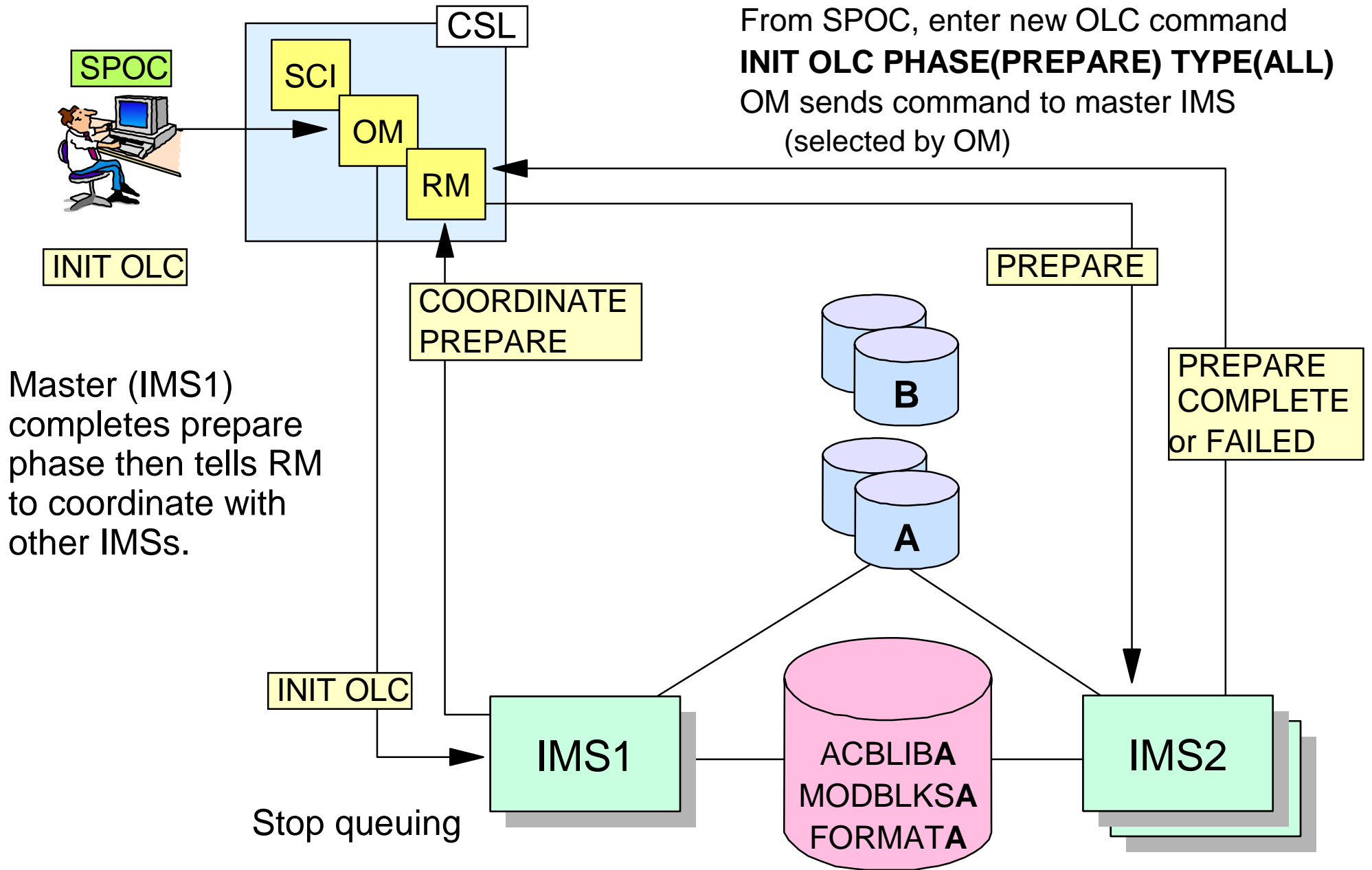
DFSUOLC0 utility

- Global online change utility to:
 - ▶ initialize OLCSTAT dataset
 - ▶ recreate OLCSTAT dataset after severe error
- Must be run before the 1st IMS coldstarts the 1st time
- **WARNING:** May destroy OLCSTAT dataset contents if run by mistake
- An installation should have a procedure in place to recreate the OLCSTAT dataset after severe error

Before Global OLC Begins

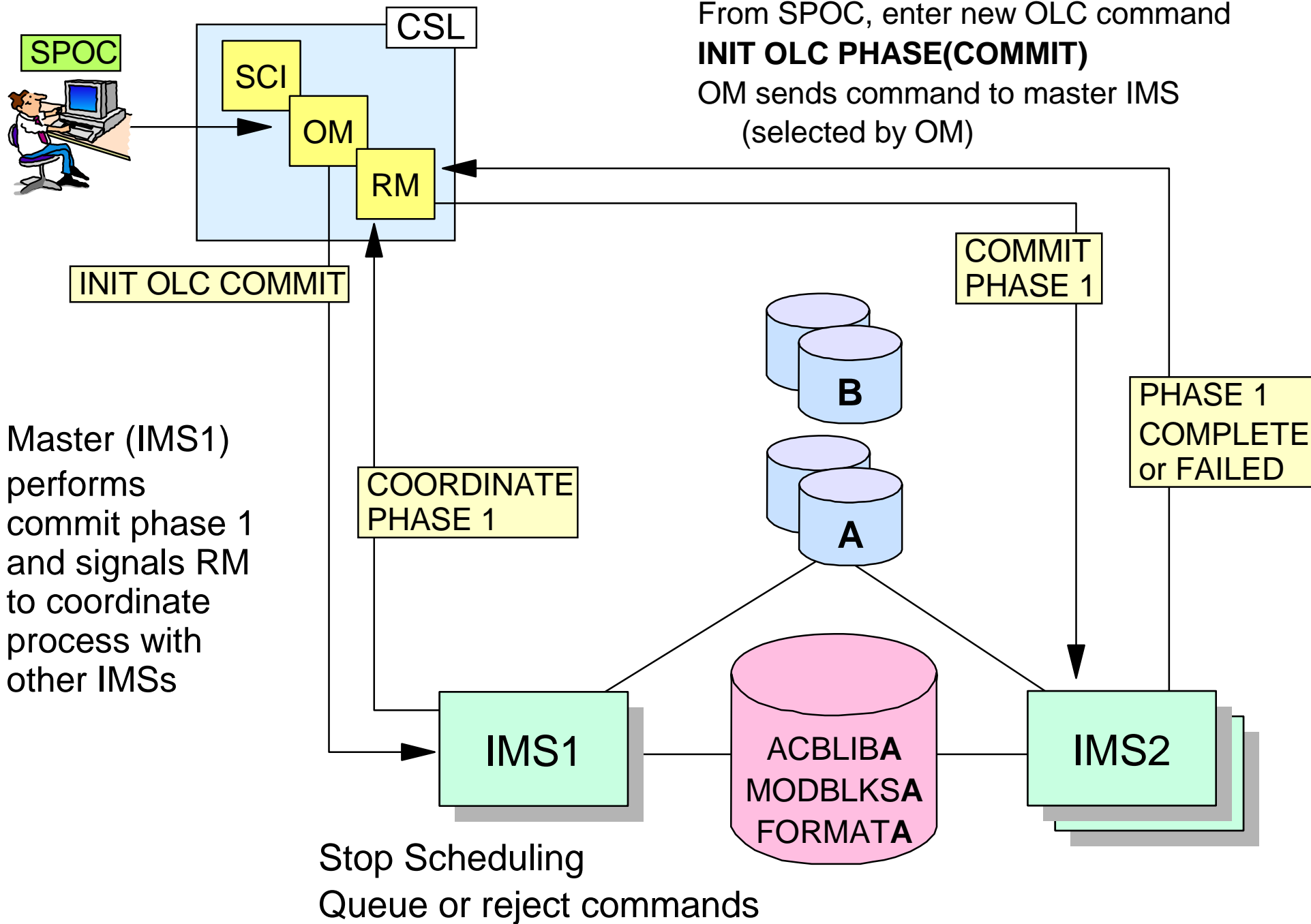


Global OLC Prepare Phase



Global OLC Commit Phase 1

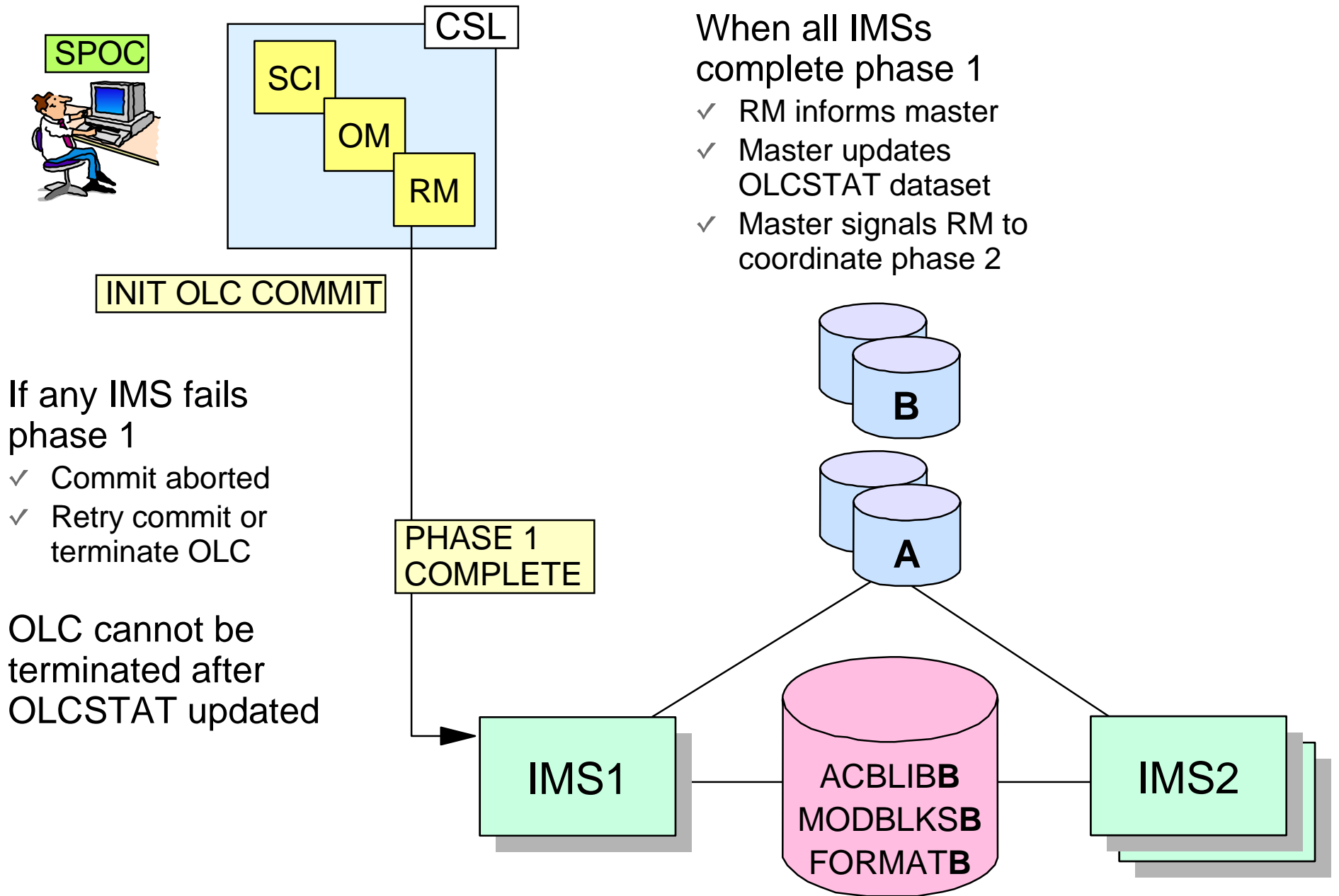
From SPOC, enter new OLC command
INIT OLC PHASE(COMMIT)
 OM sends command to master IMS
 (selected by OM)



Master (IMS1) performs commit phase 1 and signals RM to coordinate process with other IMSs

Stop Scheduling
 Queue or reject commands

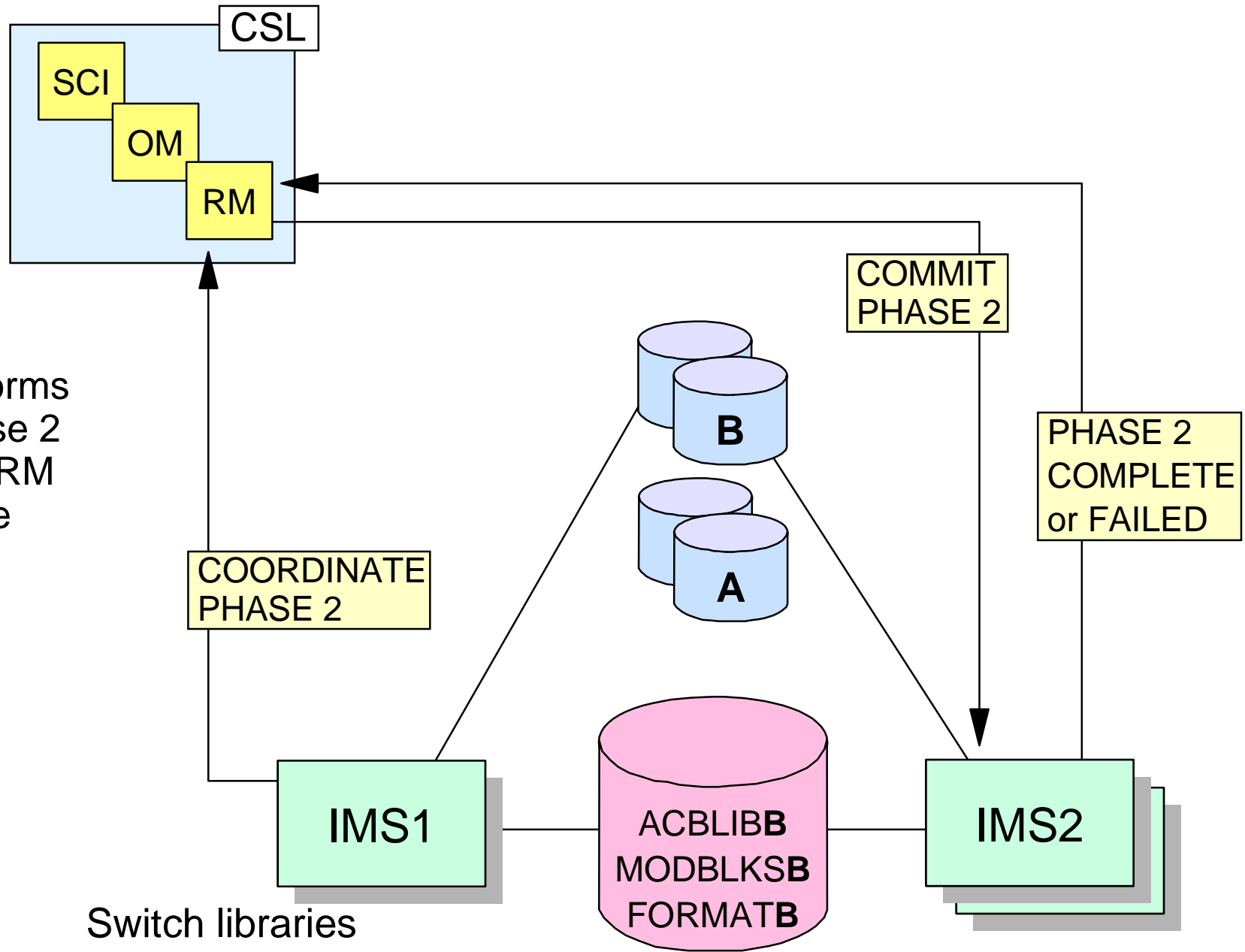
Global OLC Commit 1 Complete



Global OLC Commit Phase 2



SPOC

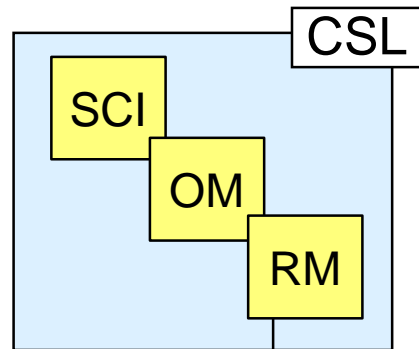


Switch libraries
Resume processing

Global OLC Commit 2 Complete



SPOC



RM signals master that phase 2 is complete

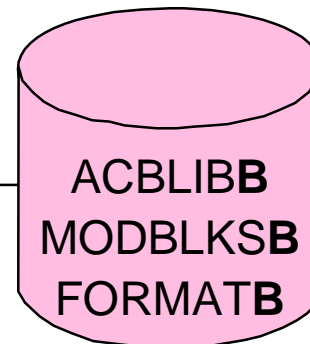
- ✓ Phase 3 initiated to cleanup local storage and OLCSTAT

If any IMS fails phase 2

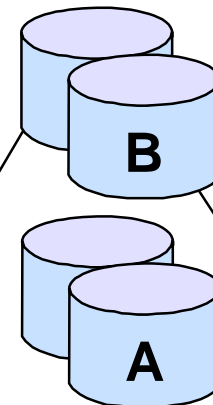
- ✓ Very rare
- ✓ Retry commit or cancel IMS and warmstart

PHASE 2 COMPLETE

IMS1



IMS2



Global OLC Commands example

TSO SPOC INPUT:

```
INITIATE OLC PHASE(PREPARE) TYPE(MODBLKS)
```

TSO SPOC OUTPUT:

MbrName	Member	CC	ACBLIB	FMTLIB	MODBLKS	ModId
IMS3	IMS2	0				
IMS3	IMS3	0	A	A	A	0
IMS3	SYS3	0				

TSO SPOC INPUT:

```
INITIATE OLC PHASE(COMMIT)
```

TSO SPOC OUTPUT:

MbrName	Member	CC	ACBLIB	FMTLIB	MODBLKS	ModId
IMS3	IMS2	0				
IMS3	IMS3	0	A	A	B	1
IMS3	SYS3	0				

QUERY MEMBER command

- Displays global online change status of IMSs in IMSplex
- Displays local online change status of IMSs in IMSplex
- Displays IMS status
- Helps you decide what to do after INITIATE OLC or TERMINATE OLC failure

QUERY MEMBER status

Status	Meaning
LEOPT	Language Environment options
OLCABRTC	OLC abort completed
OLCABRTI	OLC abort in progress
OLCCMT1C	OLC commit phase 1 completed
OLCCMT1I	OLC commit phase 1 in progress
OLCCMT2C	OLC commit phase 2 completed
OLCCMT2F	OLC commit phase 2 failed
OLCCMT2I	OLC commit phase 2 in progress
OLCMSTR	OLC command master
OLCPREPC	OLC prepare phase completed
OLCPREPF	OLC prepare phase failed
OLCPREPI	OLC prepare phase in progress
OLCTERM C	OLC terminate completed
OLCTERM I	OLC terminate in progress
XRFALT	XRF alternate system

QUERY MEMBER attributes

Attribute	Meaning
GBLOLC	Global online change enabled
RSRTRK	RSR tracker system
SHAREDQ	Shared queues enabled

QUERY MEMBER example

TSO SPOC INPUT:

```
QUERY MEMBER TYPE(IMS) SHOW(ALL)
```

TSO SPOC OUTPUT:

MemName	CC	Type	Status	LclAttr	LclStat	ModId
IMS2	0	IMS		SHAREDQ,GBLOLC	OLCPREPC	0
IMS3	0	IMS		SHAREDQ,GBLOLC	OLCPREPC	0
IMS3	0	IMS	OLCPREPC			
SYS3	0	IMS		SHAREDQ,GBLOLC	OLCPREPC	0

QUERY OLC command

- Displays active online change libraries
 - ▶ ACBLIBA/ACBLIBB
 - ▶ FMTLIBA/FMTLIBB
 - ▶ MODBLKSA/MODBLKSB and MATRIXA/MATRIXB
- Displays OLCSTAT dataset name
- Displays modify id
- Displays IMSs current with online change libraries
 - ▶ These IMSs may warmstart

QUERY OLC example

TSO SPOC INPUT:

```
QUERY OLC LIBRARY(OLCSTAT) SHOW(ACTVLIB,MODID,MBRLIST)
```

TSO SPOC OUTPUT:

Member Name	CC Library	ACBLIB	FMTLIB	MODBLKS	Modid	Member List
IMS3	0 OLCSTAT	B	A	B	1	IMS3, SYS3, IMS2

OLC Command Error Handling

IMSplex State after OLC command error	Action
Some IMSs in a prepare complete state	TERMINATE OLC Correct problem before retry
All IMSs in a prepare complete state	INIT OLC PHASE(COMMIT) or TERMINATE OLC
Mix of IMSs in prepare complete & commit phase 1 complete state	Correct problem & try commit again or TERMINATE OLC
All IMSs in commit phase 1 complete state before OLCSTAT dataset updated	Correct problem & try commit again or TERMINATE OLC
All IMSs in commit phase 1 complete state after OLCSTAT dataset updated	Correct problem and try commit again. OLC is committed and cannot be aborted
Mix of IMSs in commit phase 1 & commit phase 2 complete	Correct problem and try commit again
All IMSs in commit phase 2 complete state	Correct problem and try commit again
Mix of IMSs in commit phase 2 & not in online change state	Correct problem and try commit again

Restart of IMS Down During One Global Online Change

LAST ONLINE CHANGE TYPE	RESTART COMMANDS PERMITTED
ACBLIB	/NRE CHECKPOINT 0 /ERE COLDBASE
ALL	/NRE CHECKPOINT 0
FORMAT	/NRE CHECKPOINT 0 /NRE /ERE /ERE COLDCOMM /ERE COLDBASE
MODBLKS	/NRE CHECKPOINT 0

OLC migration/fallback

- Migration to global online change can be performed one IMS at a time
- Fallback to local online change can be performed one IMS at a time
- No online switch between local online change and global online change
- IMSplex may contain a mix of IMSs enabled with local online change or global online change
 - ▶ Only IMSs with global online change enabled participate in global online change