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Part II - IMS Version 8 Common Service Layer

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e-business Powered by IMS

IMS *the world depends on it*

IMS V8 Highlights

Enhancements to ...

⭐ Database Manager

⭐ Transaction Manager

⭐ Systems

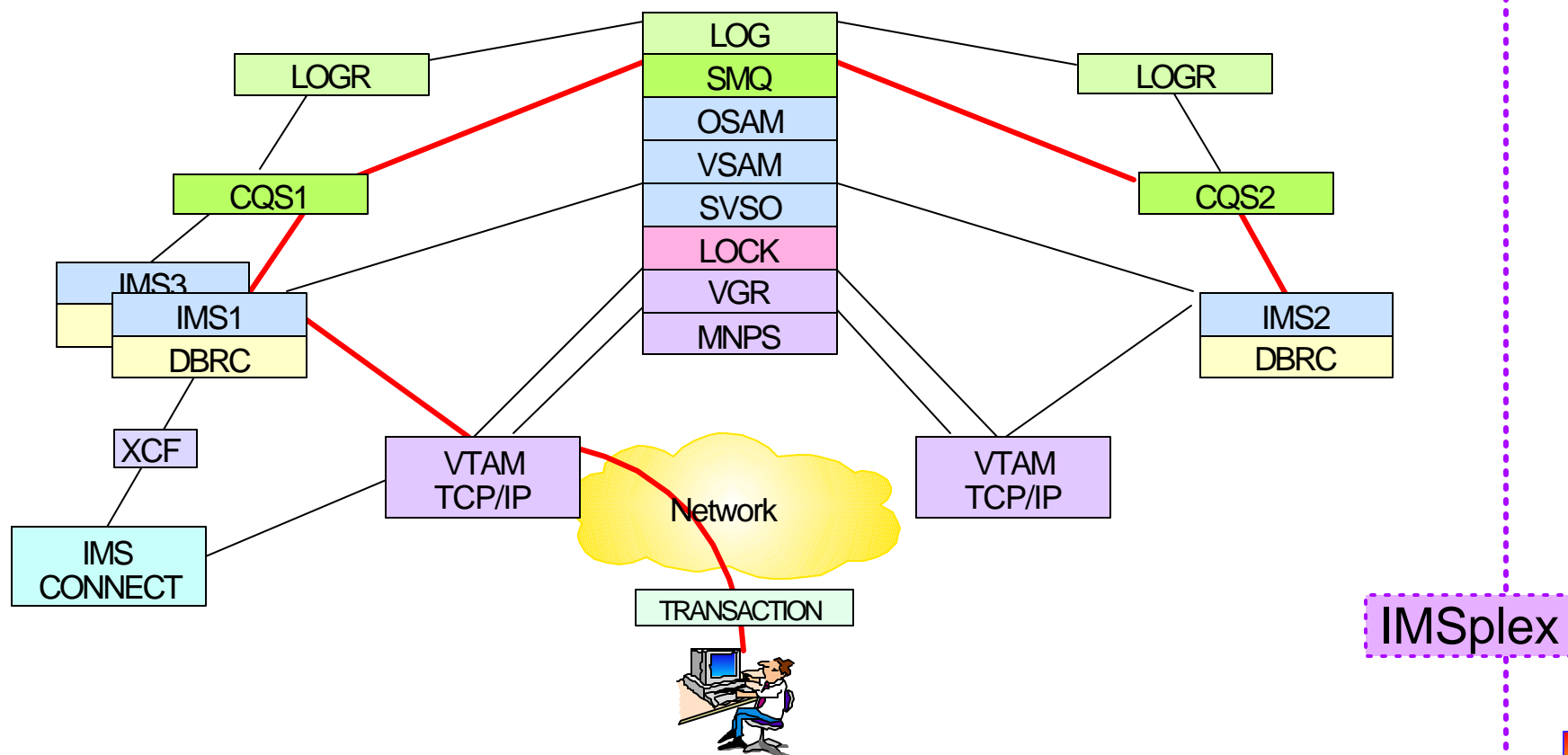⭐ Applications

Enhancements to ...

⭐ Parallel Sysplex

⭐ Common Service Layer

IMS

By the End of IMS V7

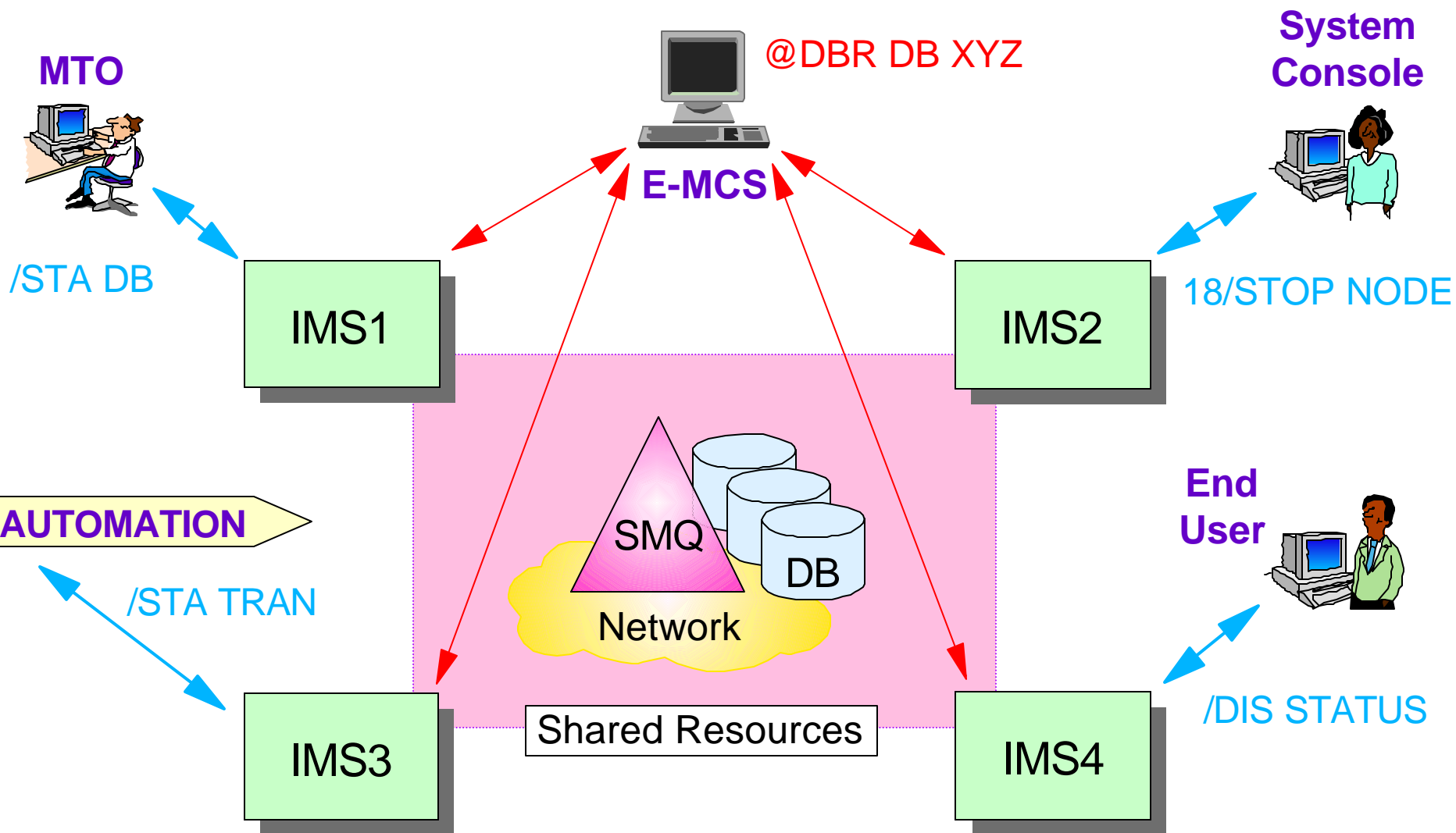IMS had exploited many parallel sysplex functions to share resources in an **IMSplex**

- ► Data sharing, shared queues
- ► VTAM generic resources, multinode persistent sessions
- ► Automatic restart management, XCF communications

Managing Shared IMS Resources

But managing these resources became more difficult

► Systems management functions needed to be more robust

MTO

@DBR DB XYZ

System Console

E-MCS

/STA DB

IMS1

IMS2

18/STOP NODE

AUTOMATION

/STA TRAN

SMQ

DB

Network

End User

Shared Resources

IMS3

IMS4

/DIS STATUS

IMS

Better Systems Management Needed

Better resource management

- ► Address the management of terminals and users throughout an IMSplex
  - *Sysplex terminal management*
- ► Coordinate the online change process across all IMSplex members
  - *Global process management*
- ► Give exits the ability to determine terminal/user status globally
  - *Global callable services*

Better operations management

- ► Facilitate operational control of IMSplex members
  - *Single Point of Control*
  - *Global automation*
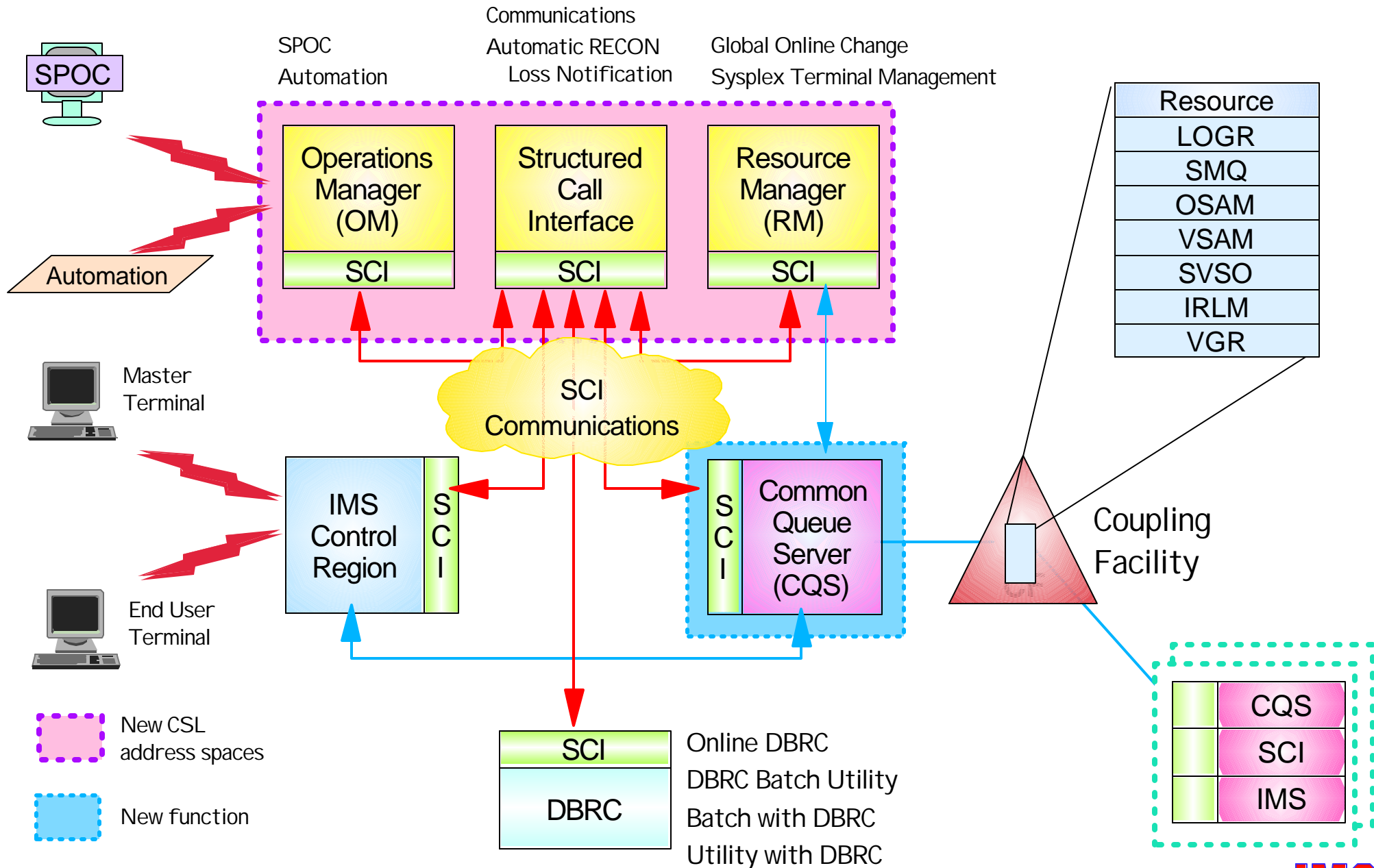
The IMSplex

Definition of an IMSplex

► 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 with a *common service layer (CSL)*

- Note: The IMSplex is not new, we're just now formalizing the term

► Examples of an **IMSplex** include ...

- A set of IMS control regions at the V6 and/or V7 and/or V8 level without a CSL that are data sharing or message queue sharing

- A set of IMS control regions at the V6 and/or V7 level (no CSL) that are data sharing or message queue sharing with V8 with a CSL

- A set of IMS control regions at the V8 level with a CSL that are data sharing or message queue sharing

- A single IMS control region at the V8 level with a CSL
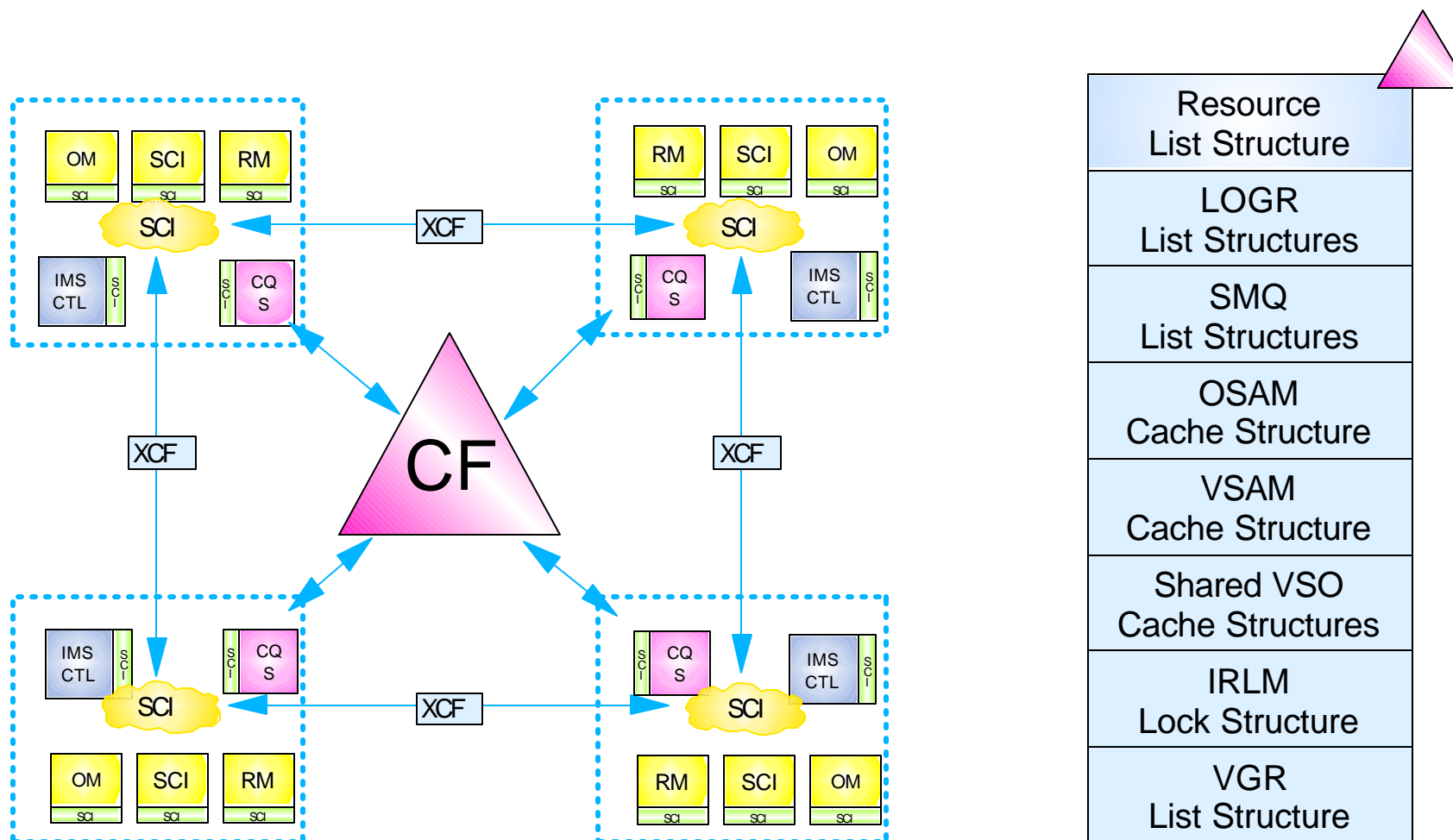
IMS

Common Service Layer (CSL)

The next step in IMS architectural evolution

- ► New *address spaces* built on Base Primitive Environment
  - *Structured Call Interface (SCI)*
    - IMSplex member registration
    - Communications between IMSplex members
  - *Operations Manager (OM)*
    - IMSplex-wide command entry and response
  - *Resource Manager (RM)*
    - Global resource and process management
    - VTAM terminal/user status recovery
- ► Enables new systems management *functions* in IMSplex
  - *Sysplex Terminal Management (STM)*
    - Uses SCI and RM
  - *Single point of control (SPOC) and user-provided automation (AOP)*
    - Uses SCI and OM
  - *Coordinated Online Change (Global Online Change)*
    - Uses SCI, OM, and RM

IMS

CSL Architecture

SPOC

Automation

SPOC
Automation

Communications
Automatic RECON
Loss Notification

Global Online Change
Sysplex Terminal Management

Operations Manager (OM)

SCI

Structured Call Interface

SCI

Resource Manager (RM)

SCI

SCI Communications

Master Terminal

IMS Control Region

SCI

End User Terminal

SCI

Common Queue Server (CQS)

Coupling Facility

Resource
LOGR
SMQ
OSAM
VSAM
SVSO
IRLM
VGR

New CSL address spaces

New function

SCI

DBRC

Online DBRC
DBRC Batch Utility
Batch with DBRC
Utility with DBRC

CQS
SCI
IMS

IMS

IMSplex Configuration

★ In an IMSplex

  ✎ All members share the same CF structures

  ✎ Intra-IMSplex communications is implemented by SCI using XCF across OS images

IMS V8 Highlights

CSL Components

- ★ **Structured Call Interface**
- ★ **Operations Manager**
- ★ **Resource Manager**
- ★ **Resource Structure**

CSL Components (SCI)

SCI address space

► Provides for standardized intra-IMSplex *communications* between members of an IMSplex

► Provides *security authorization* for IMSplex membership

► Provides SCI *services to registered members*

Stuctured call interface services

► Used by SCI clients to
- Register/deregister as member of IMSplex
- Communicate with other members

► SCI client issues CSL macros to request SCI services
- Documented in **CSL Guide and Reference** manual

SCI configuration

► One SCI address space is *required on each OS/390 or z/OS image* with IMSplex members

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Structured Call Interface (SCI)

IMSplex address spaces register with SCI

- ► CSL address spaces
  - Operations Manager (OM)
  - Resource Manager (RM)
- ► Common Queue Server (CQS)
- ► IMS
  - DB/DC, DBCTL, DCCTL, FDBR
- ► Automated Operator Programs (AOP)
- ► DBRC
  - Online DBRC address space
  - DBRC utility (DSPURX00)
  - Batch with DBRC=Y
  - DLI Utilities with DBRC=Y
- ► Other
  - CSL (SCI) interface is documented
  - May be accessed by user or vendor programs

Registrants may abend if SCI not available when required.
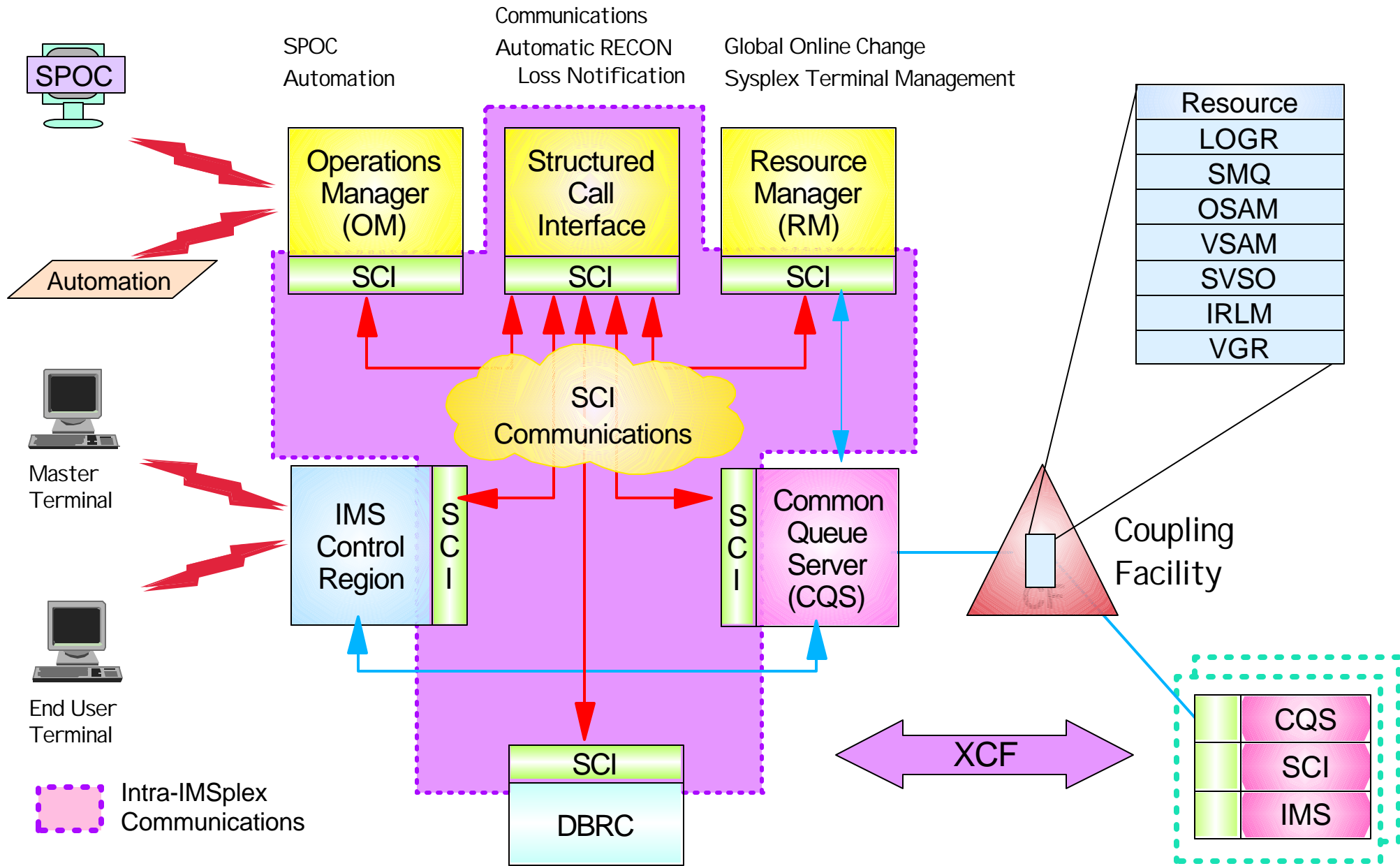
IMS

Structured Call Interface ...

SPOC
Automation

Communications
Automatic RECON
Loss Notification

Global Online Change
Sysplex Terminal Management

SPOC

Operations Manager (OM)

SCI

Structured Call Interface

SCI

Resource Manager (RM)

SCI

Automation

Master Terminal

IMS Control Region

S C I

SCI Communications

S C I

Common Queue Server (CQS)

Coupling Facility

End User Terminal

SCI

DBRC

XCF

Resource
LOGR
SMQ
OSAM
VSAM
SVSO
IRLM
VGR

CQS
SCI
IMS

Intra-IMSplex Communications

IMS

IMS V8 Highlights

CSL Components

- ★ **Structured Call Interface**
- ★ **Operations Manager** ✦
- ★ **Resource Manager**
- ★ **Resource Structure**

IMS

CSL Components (OM)

Operations Manager (OM)

- ▶ Provides an API supporting *common point of command entry*
  - Focal point for operations management and automation
  - Command responses from multiple IMSs are consolidated
- ▶ Provides the following services to members and clients of an IMSplex
  - *Provide an API* for IMS commands submitted from outside IMS
    - Classic IMS commands (/cmd ...)
    - *New IMSplex commands (QRY, INIT, TERM, DEL, UPD)*
  - *Command registration* to support any command processing client
    - Clients tell OM which commands it can process
  - *Command security*
    - Perform authorization within OM - before sending to IMS
    - RACF or user-written command security exit
  - *Route commands* to IMSplex members registered for the command
  - *Consolidate command responses* from individual IMSplex members into a single response to present to the command originator

IMS

Operations Manager – API

OM provides an API for

- ► **Command processing (CP) clients**
  - Clients which process commands entered from other address spaces
  - IMS is a command processing client

- ► **Automated operations (AO) clients**
  - Clients through which commands are entered to OM and then to the command processing client

  - Command may originate with operator, be received from a network client, are be generated by an automation process

- ► All OM services are invoked by CSLOMxxx macros
  - Macro coding and use is described in *CSL Guide and Reference*

IMS

Command Processing Client

Command processing client

- ► OM client that processes commands
  - IMS and RM are command processing clients of OM
- ► CP client
  - Registers with SCI
    - Must be on same OS image
  - Registers with OM
    - Identifies commands that it can process
    - Any OM in IMSplex

  - Processes commands received from OM
  - Sends command response back to OM

  - Deregisters from OM
  - Deregisters from SCI

Structured Call Interface	Operations Manager
	Command Processing Client (IMS)
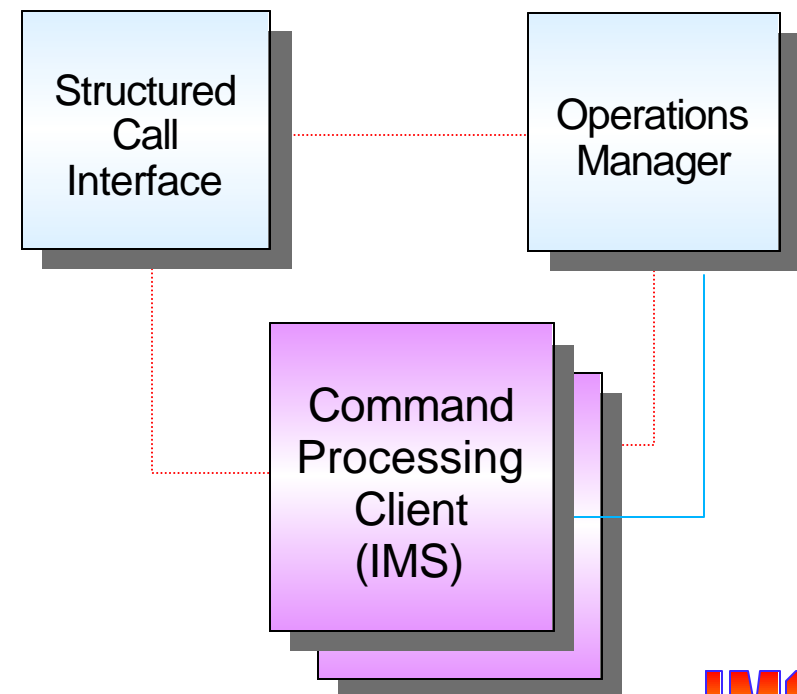
AO Client

S/390 address space

- ► Command originates from
  - Operator (TSO SPOC)
  - Automation (NetView Exec)
  - Network client (DB2 Control Center?)

- ► AO client
  - Registers with SCI

  - Accepts or creates command
  - Uses **CSLOMx** macro interface to
    - Send command to OM
    - Receive reply (in XML format)
  - Processes reply
    - Format for display
    - Forward to network client

  - Deregisters from SCI

Workstation AO Client

VTAM (TCP/IP)

TSO SPOC

NetView Exec

Command Entry AO Client

Structured Call Interface

Operations Manager

Command Processing Client (IMS)

IMS

OM Is Part of the CSL

SPOC

Automation

MTO

VTAM

(TCP/IP)

End Users

Operations Manager (OM) — SCI

Structured Call Interface — SCI

Resource Manager (RM) — SCI

SCI Communications

IMS Control Region — SCI

Common Queue Server (CQS) — SCI

Resource List Structure
LOGR List Structures
SMQ List Structures
OSAM Cache Structure
VSAM Cache Structure
Shared VSO Cache Structures
IRLM Lock Structure
VGR List Structure

IMSplex must have at least one
OM address space - may have multiple OMs.

OM in an IMSplex

SPOC

Automation
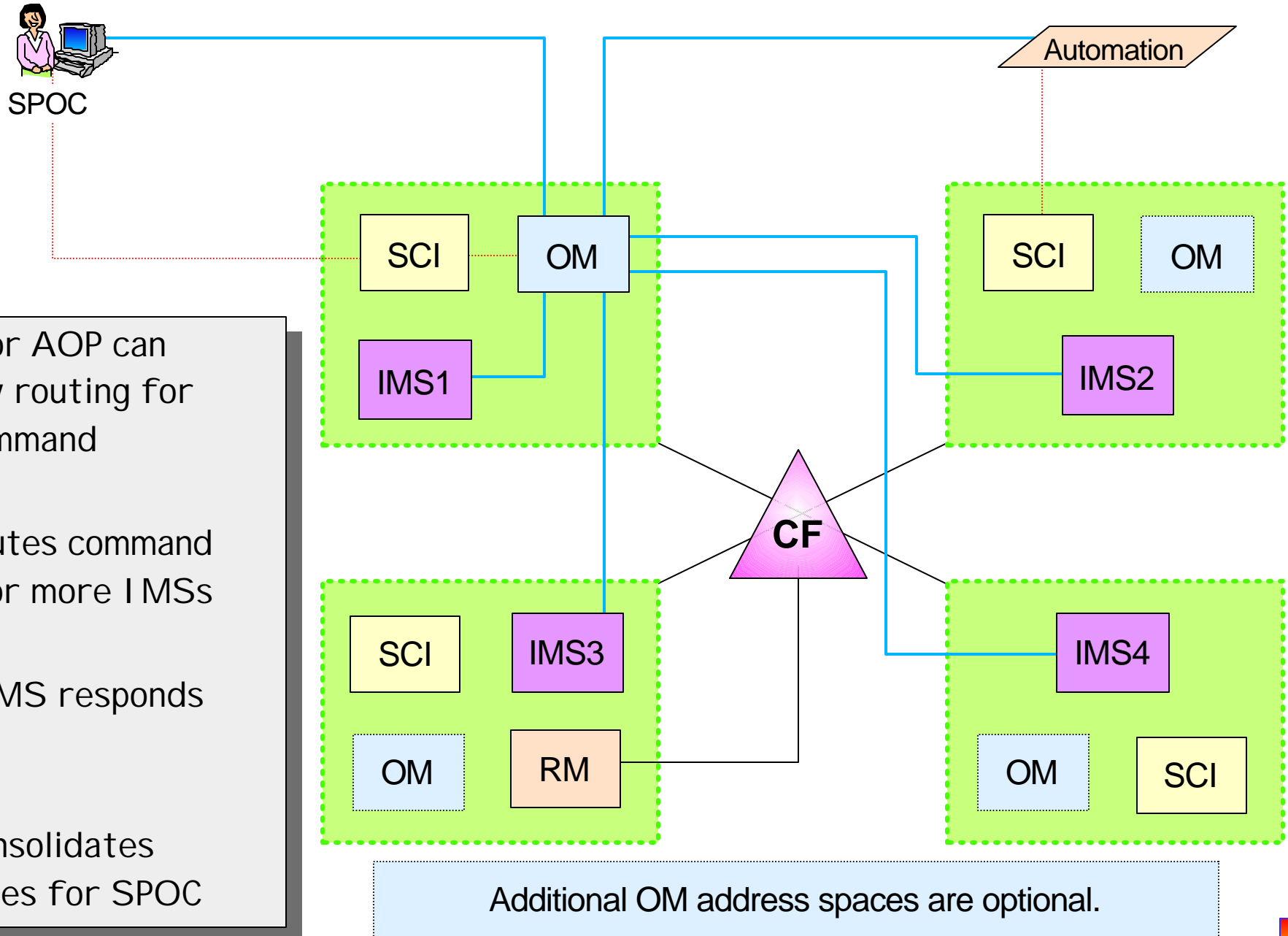
SPOC or AOP can specify routing for any command

OM routes command to one or more IMSs

Each IMS responds to OM

OM consolidates responses for SPOC

SCI   OM

IMS1

SCI   OM

IMS2

CF

SCI   IMS3

OM   RM

IMS4

OM   SCI

Additional OM address spaces are optional.

IMS

OM – Command Support

Commands

- ★ New IMSPlex commands
- ★ Classic IMS commands
- ★ Command entry and response
- ★ Command Security

New IMSPlex Commands

INIT (INITiate process)

- ▶ INIT OLC - starts a global online change (G-OLC) process

TERM (TERMinate process)

- ▶ TERM OLC - stops a global online change that is in progress

UPD (UPDate resource)

- ▶ UPD LE - updates dynamic LE runtime options
- ▶ UPD TRAN - updates selected TRAN attributes

DEL (DELete resource)

- ▶ DEL LE - deletes dynamic runtime LE options

IMS

New IMSPlex Commands ...

QRY (QueRY resource)

- ► QRY IMSPLEX - returns information about one or more members of the IMSplex

- ► QRY MEMBER - returns status and attributes of the IMS members in the IMSplex

- ► QRY LE - returns runtime LE options

- ► QRY OLC - returns OLC library and resource information

- ► QRY TRAN - returns TRAN info similar to /DIS TRAN

- ► QRY STRUCTURE - returns structure information of the RM resource structure

IMS

UPD / QRY TRAN Example

```
UPD TRAN NAME(PART) SCOPE(ALL) STOP(Q,SCHD)
    START(TRACE) SET(CLASS(4))
```

TRANCODE	MBRNAME	CC
PART	IMS1	0
PART	IMS2	0
PART	IMS3	0

> Actual response is in XML format. Formatting for display is the responsibility of the command originator.

```
QRY TRAN NAME(PART) SHOW(CLASS,STATUS)
```

TRANCODE	MBRNAME	CC	CLS	STATUS
PART	IMS1	0	4	STOQ,STOSCHD,TRA
PART	IMS2	...		

Classic IMS Commands
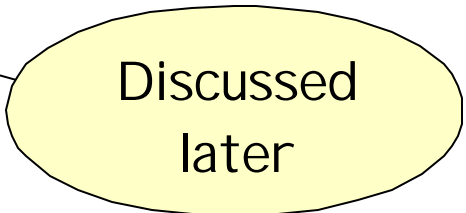
Most classic IMS commands (/cmd ...) can be entered through OM API

- ► IMS commands specific to an input LTERM or NODE are not supported from OM
  - For example

    `/SIGN ON|OFF, /EXIT, /REL, /RCL, ...`

If <u>Resource Structure</u> exists, some commands have global impact, for example

`/STOP NODE ABC`

Discussed later

- ► Node ABC is flagged as stopped in resource structure
- ► Node ABC cannot log on to any IMS in IMSplex

IMS

Classic IMS Commands ...

Some commands execute in every IMS where command sent

- ► Not aware of IMSplex

    `/DIS TRAN TRX1 QCNT`

    - • Will execute in each IMS where command is routed
    - • All will return same value (global queue count)

Most commands depend on several factors

- ► Command source, RM active with structure, affects significant status, resource exists on structure, resource owned by this IMS, resource owned by another IMS, display or update, ...

Command changes documented in *Command Reference* manual

- ► This is worth studying!!

IMS

Command Entry and Response

For commands entered through OM API

- ► AO client specifies
  - Command text
  - Routing information
    - – Any or all IMSs
  - Wait time
    - – How long should OM wait for IMS to respond?
- ► Target IMSs (one is selected as *master* by OM)
  - Execute command locally
  - Master IMS processes commands with global scope
  - Respond to OM in *XML format*
- ► OM will consolidate responses from all target IMSs
  - Sends consolidated response to AO client
  - Negative reply if any IMS does not respond within WAIT interval
- ► AO client
  - Formats XML response for viewing   -or-
  - Sends XML response to network client

IMS

OM Command Security

Depends on CMDSEC value in OM initialization Proclib member (DFSOIxxx)

- ► If CMDSEC=E(xit) or A(ll)
  - • Define OM security exit in BPE User Exit List Proclib member

    `EXITDEF(TYPE=SECURITY,EXITS=(OMSCTYX0),COMP=OM)`

  - • Write security exit OMSCTYX (for example)
    - – Linkedit into authorized library in OM steplib
- ► If CMDSEC = R(acf) or A(ll)
  - • Define OM commands and security to RACF
    - – QRY requires READ access
    - – UPD, INIT, TRM, and DEL require UPDATE access

In (new) IMS Proclib member DFSCGxxx

- ► Should OM entered commands be authorized by IMS?

    `CMDSEC=R|E|A|N`

IMS

OM Command Security ...

RACF definitions

- ► Define classic and IMSplex commands
- ► Permit users READ or UPDATE access to commands

```
RDEFINE  OPERCMDS IMS.CSLPLX0.UPD.TRAN UACC(NONE)
RDEFINE  OPERCMDS IMS.CSLPLX0.STO.DB UACC(NONE)
RDEFINE  OPERCMDS IMS.CSLPLX1.UPD.TRAN UACC(NONE)
RDEFINE  OPERCMDS IMS.*.QRY.* UACC(NONE)
RDEFINE  ....
PERMIT   IMS.CSLPLX0.UPD.TRAN CLASS(OPERCMDS)
         ID(MAKENA) ACCESS(UPDATE)
PERMIT   IMS.*.QRY.* CLASS(OPERCMDS)
         ID(LUKE) ACCESS(READ)
PERMIT   IMS.*.UPD.* CLASS(OPERCMDS)
         ID(NICK) ACCESS(UPDATE)
PERMIT   IMS.CSLPLX0.STO.DB CLASS(OPERCMDS)
         ID(ANDREA) ACCESS(UPDATE)
PERMIT   ....
```

Exploiting the OM API

TSO SPOC

★ Provided with IMS V8

REXX EXEC

★ Sample exec using OM API

SPOC Registers with Local SCI

Single Point of Control (SPOC)

Structured Call Interface

SCI

Operations Manager (OM)

SCI

IMS Control Region — SCI

IMS Control Region — SCI

IMS Control Region — SCI

- - -▶ Register with SCI

◀—▶ Command entry and response

IMS
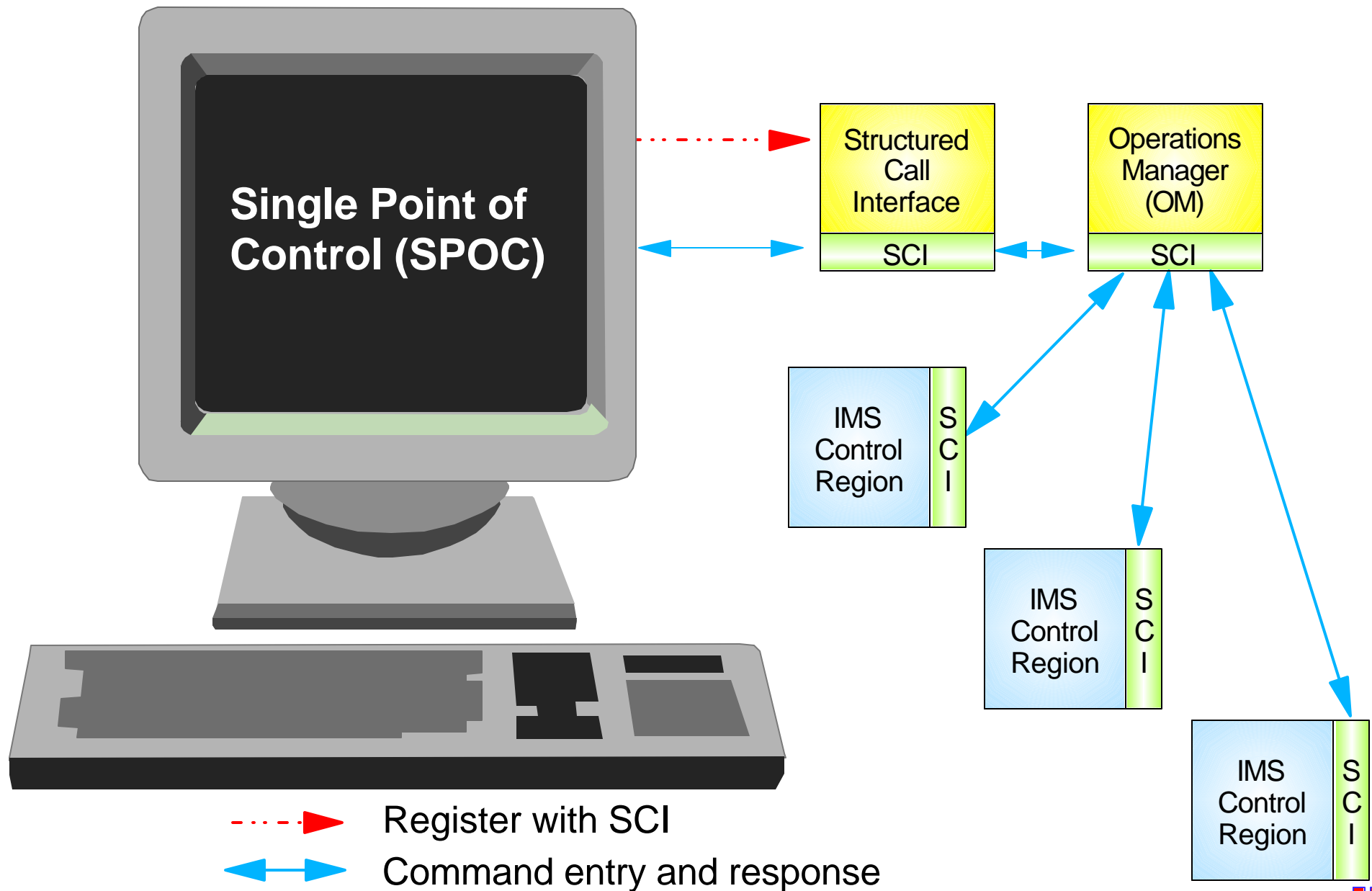
IMS Single Point Of Control (SPOC)

TSO SPOC

- ► Runs under MVS and TSO
  - ISPF Application (DFSSPOC)

- ► May or may not be on the same MVS as OM
  - Must be on same MVS as SCI
  - Uses SCI to communicate with OM

- ► Provides a terminal from which IMS commands may be entered by a person to one or more members of an IMSplex

- ► Formats command responses to be read by a person
  - OM response is encapsulated in XML

- ► OM provides security checking
  - TSO userid is used to determine RACF authorization

IMS

SPOC Features

The SPOC application will ...

- ▶ Allow user to set preferences

- ▶ Allow the user to specify shortcuts and set default command parameters

- ▶ Allow user specified grouping of IMSplex members

- ▶ Allow the user to enter commands to one or more IMSs

- ▶ Display consolidated IMSplex and classic IMS command responses

- ▶ Allow the user to sort IMSplex command response by column

- ▶ Keep a history of commands

- ▶ Allow the user to enter long commands

IMS

Preferences

```
                 IMS Single Point of Control Preferences
Command ===>
Select your options and press the Enter key.


Default IMSplex. . . . PLX0
Default routing. . . . IMS1 IMS2 IMS3 IMS4_____


Wait interval. . . . . 2:45    (MM:SS)
Waiting preference . . 1  1.   Wait for command to complete.
                          2.   Do not wait for command response.


Command shortcuts. . . 1  1.   Use command shortcuts.
                          2.   Do not use command shortcuts.


Shortcut processing. . 2  1.   Merge explicit and default parameters.
                          2.   Explicit parameters override defaults.


Initial view . . . . . 1  1.   SPOC command panel.
                          2.   SPOC status list.
```

IMS

Command Shortcuts

```
  File   Display  View  Options  Help
-------------------------------------------------------------------
                     SPOC Command Shortcuts
Command ===>  _____


----------------------- Plex . _____  Route . _____  Wait . ____
Act    Command              Additional Parameters

____   _____    _____


____   &QRYPLX_____    QRY_IMSPLEX SHOW(STATUS)_____


____   QRY_MEMBER_____    TYPE(IMS) SHOW(ALL)


____   QRY_TRAN_____     NAME(A*) SHOW(ALL)_____


____   /DIS REGION        ACTIVE



************************* Bottom of data ***********************
```

IMS

Group Definitions

```
Help
---------------------------------------------------------------
             Single Point of Control Group Definitions
COMMAND ===> _____


Enter a group name and member names to add a new group. Enter 's'
to select a default, or 'd' to delete a group.


Default routing . . . : IMS1234



Act     Group        IMSplex members

___     _____     _____


S__     IMS1234_     IMS1 IMS2 IMS3 IMS4_____


___     IMS13___     IMS1 IMS3 _____


************************* Bottom of data *********************
```

IMS

Command Entry Panel

```
  File   Display  View  Options  Hel
---------------------------------------
                    IMS Single Poi
Command ===> _____              ⟸  command line

---------------------- Plex . ___
Response for: QRY IMSPLEX
IMSplex     MbrName       CC   Member
PLX0        OM1            0   IMS5
PLX0        OM1                              ⟸  command
                                                response



F13=Help F15=Exit F16=Showlog
```

IMS

Command Entry

```
 File  Display  View  Options  Help
---------------------------------------------------------------
 PLX0                  IMS Single Point of Control
 Command ===> QRY TRAN NAME(A*) SHOW(ALL)
 ----------------------- Plex . _____  Route . IMS13____  Wait . ____
 Response for:




      Override Preferences






 F13=Help F15=Exit F16=Showlog F18=Expand  F21=Retrieve  F24=Cancel
```
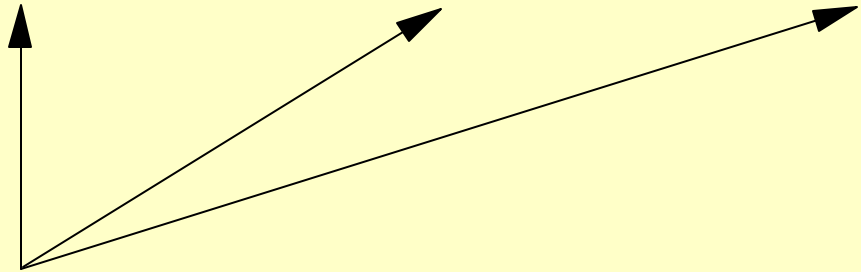
Command Response

```
   File   Display   View   Options   Help
------------------------------------------------------------------
                   IMS Single Point of Control
Command ===> _____
--------------------- Plex . _____  Route . IMS13____  Wait . ____
Response for: QRY TRAN NAME(A*) SHOW(ALL)              More:    +>
Trancode MbrName    CC PSBname        QCnt LCls    LQCnt  LLCT LPLCT
ADDINV   IMS1       0                      0
ADDINV   IMS1       0 DFSSAM04              4       0      2 65535
ADDPART  IMS3       0                      0
ADDPART  IMS3       0 DFSSAM04              4       0      2 65535
AOBMP    IMS1       0                      0
AOBMP    IMS1       0 TS2IAOB0             23       0 65535 65535
etc.
```

Display formatted by SPOC
from XML response.

```
F13=Help F15=Exit F16=Showlog F18=Expand  F21=Retrieve  F24=Cancel
```

Classic Command and Response

```
 File  Display  View  Options  Help
----------------------------------------------------------------
                  IMS Single Point of Control
Command ===> _____
---------------------- Plex . _____  Route . IMS13____  Wait . ____
Log for . . .: /DIS STATUS DATABASE
IMSplex . . . . . : PLX0
Routing . . . . . : IMS13
Start time. . . . : 2001.199 16:43:53.31
Stop time . . . . : 2001.199 16:43:54.47
Return code . . . : 00000000

Reason code . . . : 00000000
Command master. . : IMS4


MbrName       Messages
IMS1          **DATABASE**
IMS1          STATUS UNRESTRICTED
IMS3          **DATABASE**
IMS3          BANKATMS   NOTINIT, NOTOPEN, STOPPED


F13=Help F15=Exit F16=Showlist F18=Expand  F21=Retrieve F24=Cancel
```

Command message log can be shown at top or bottom of display.

Display formatted by SPOC as received from IMS. Each line is one XML tag.

Command Entry Using Shortcut

```
 File  Display  View  Options  Help
----------------------------------------------------------------
 PLX0                 IMS Single Point of Control
 Command ===> QRY TRAN
 ----------------------- Plex . _____  Route . IMS13____  Wait . ____
 Response for:
```

QRY TRAN command without parameters uses defaults from SHORTCUTS.

```
 F13=Help F15=Exit F16=Showlog F18=Expand  F21=Retrieve  F24=Cancel
```

IMS

Command Entry Using Shortcut ...

```
 File  Display  View  Options  Help
-------------------------------------------------------------------
 PLX0                    IMS Single Point of Control
 Command ===> QRY TRAN NAME(B*) SHOW(QCNT)
 ----------------------- Plex . _____  Route . IMS13____  Wait . ____
 Response for:
```

QRY TRAN command with parameters
may override or be merged with
parameters defined in SHORTCUT.

Depends on PREFERENCE.

```
 F13=Help F15=Exit F16=Showlog F18=Expand  F21=Retrieve  F24=Cancel
```

Action Bar

```
   File  Display  View  Options  Help
----- +-----------------------------+ -------------------------
PLX0  |    1. Cmd entry & response  | oint of Control
Comma |    2. Cmd entry & log       |
      |    3. Command status        |
      |    4. Command shortcuts     | x .         Route .
Respo |    5. Expand command...     |
      +-----------------------------+
```

Cmd Entry and Log   shows error or non-response messages
Command Status   shows recent commands and responses
Expand Command is used for long commands

FILE   includes SAVE AS and PRINT
VIEW   includes FIND and SORT
OPTIONS   includes setting PREFERENCES and GROUPS

REXX SPOC Application

Sample REXX interface to OM

- ► Run under TSO, Netview, ...

- ► May or may not be on the same MVS as OM

- ► Uses SCI to communicate with OM

- ► Saves command responses to a REXX "stem variable"

REXX SPOC Environment

CSLULXSB (TSO command)

- ► Sets up the REXX environment for the REXX SPOC API

- ► Establishes REXX function for retrieving response
  - • CSLULGTS()

- ► Provides REXX variables for return code and reason code

Example:

- ► To send command to TSO environment

  Address TSO "CSLULXSB"

IMS

REXX SPOC Environment ...

IMSSPOC (TSO command)

► Establishes IMSSPOC environment

► Subcommands

- IMS
  - Sets the name of the IMSplex

- ROUTE
  - Sets the names of the IMSplex members

- CART
  - Sets the name of the Command and Response Token

- WAIT
  - Sets the OM timeout value in mm:ss

REXX SPOC Environment ...

CSLULGTS() (REXX function)

- ► Retrieves command response from OM and puts it into a REXX stem variable

- ► Parameters
  - Stem variable name
  - CART name
  - CSLULGTS() function timeout value seconds

REXX SPOC Example

```
 1   /* sample rexx exec */
 2   parse upper arg theIMScmd
 3   Address TSO 'CSLULXSB'
 4   if rc = 0 then do
 5       Address IMSSPOC
 6       "IMS    plx0"
 7       "ROUTE ims1"
 8       "CART   test12"
 9       "WAIT   3:00"
10       theIMScmd
11       results = cslulgts('resp.','test12',"3:15")
12       say 'imsrc='imsrc    'imsreason='imsreason
13       if resp.0 /= '' then do
14            say resp.0' lines of output'
15            do indx = 1 to resp.0
16               say resp.indx
17            end
18       end
19       "END"
20   End
```

OM Summary – Operations Manager

Operations Manager is part of Common Service Layer

- ► Joins IMSplex
  - Registers with SCI
  - Uses SCI to communicate with other IMSplex members

- ► One OM address space required per IMSplex
  - May have multiple OMs for availability and performance
  - Built on Base Primitive Environment (BPE)

- ► Provides services to IMSplex Command Processing (CP) and Automated Operations (AO) clients
  - API for submitting commands
  - Command registration for CP clients
  - Routes commands from AO clients to CP clients
  - Consolidates responses from CP clients and passes to AO client
  - Provides command security for classic and IMSplex commands

OM Summary – AO Clients

TSO SPOC

- ► Allows the user to enter commands using ISPF panels
  - Set preferences
  - Create groups and shortcuts
- ► Displays IMSplex and IMS classic command responses
  - Process OM XML command response
  - Search or sort response
- ► Saves and retrieves previous commands and responses
  - See previous responses
  - Edit and reenter command

REXX SPOC

- ► REXX application to enter commands through OM API
  - Register with SCI
  - Submit command and process XML command response from OM
- ► Standalone batch program, TSO application, or NetView exec
  - IMS provides TSO commands and REXX function

IMS

IMS V8 Highlights

CSL Components

★ **Structured Call Interface**

★ **Operations Manager**

★ **Resource Manager**

★ **Resource Structure**

CSL Components (RM)

Resource Manager (RM)

► *Provides infrastructure* for managing global resources and IMSplex-wide processes

► *Maintains global resource information* for clients using a Resource Structure in the Coupling Facility
- IMSplex global and local member information
- Resource names and types
- Terminal and user status
- Global process status

► Resource structure is optional
- If resource structure not defined
  - Only one RM per IMSplex
  - Sysplex terminal management not enabled

IMS

CSL Components (RM) ...

RM clients

- ► IMS control region

  - • To provide *sysplex terminal management* functions
    - – Resource type consistency across IMSplex
    - – Resource name uniqueness across IMSplex
    - – Restore terminal and user status when switching IMSs (e.g. restore conversation on new IMS after an IMS failure)

  - • To *coordinate global online change*
    - – With OM and IMS, coordinates OLC across IMSplex

  - • To expand functionality of IMS exits
    - – *Global callable services* of IMSplex-wide status

- ► Vendors?

IMS

Resource Management Infrastructure
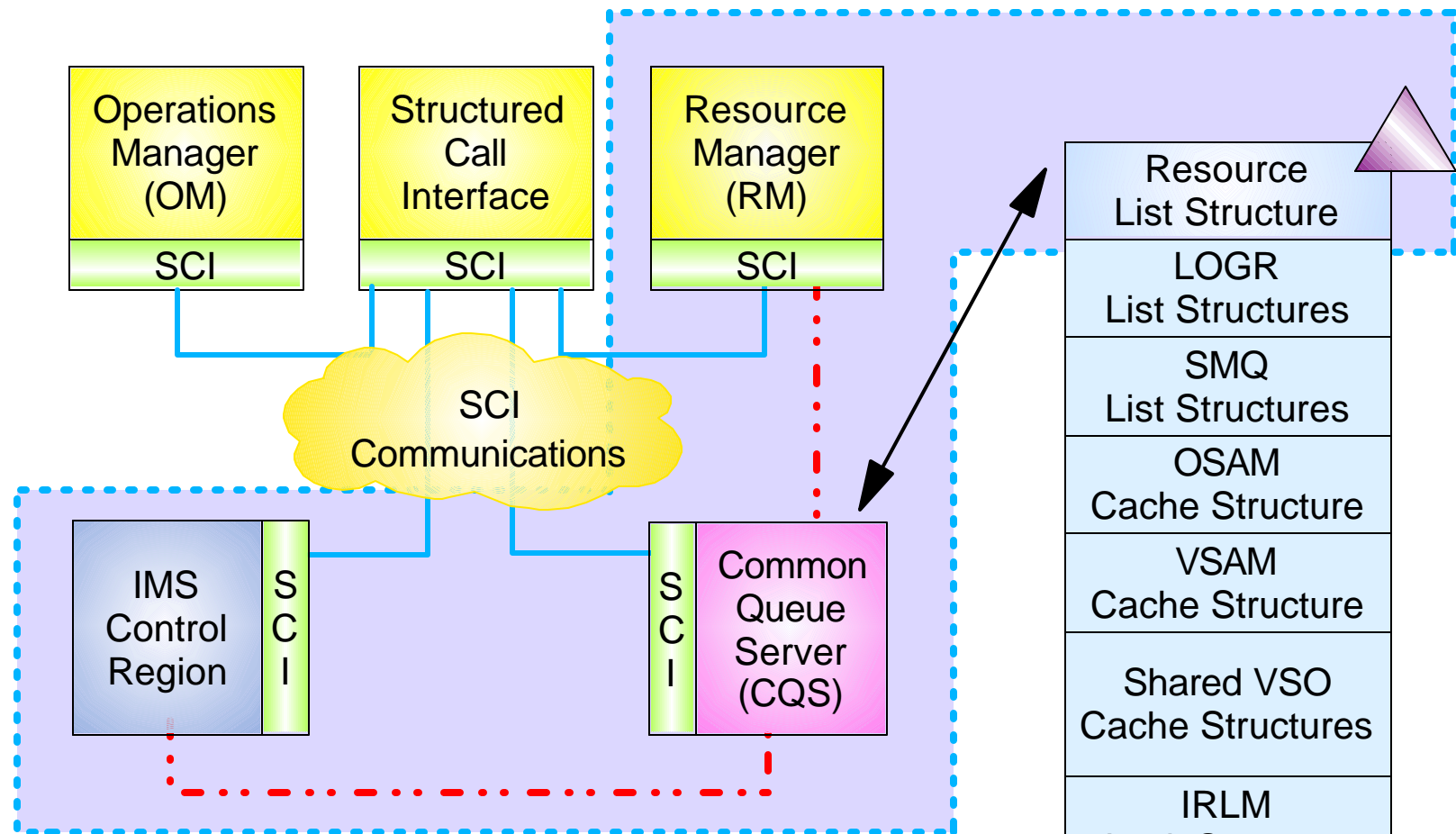
★ Resource management in the IMSplex is performed by a combination of the IMS Control Region, the Resource Manager, the Common Queue Server, and a Resource Structure.

★ SCI and OM also play a supporting role for communications and command entry.

RM Infrastucture ...

- IMS uses RM to manage resource information

- RM uses CQS to manage resource structure

- The resource structure contains information about IMS and IMSplex resources

- IMS and RM communicate using SCI services

- RM and CQS communicate using CQS services

- CQS uses XES services to access structure

Resource

IMS Control Region (CTL)
SCI

Resource Manager (RM)
SCI

Common Queue Svr (CQS)
SCI

CF

Resource Structure

CQS

CQS

IMS

CSL Highlights
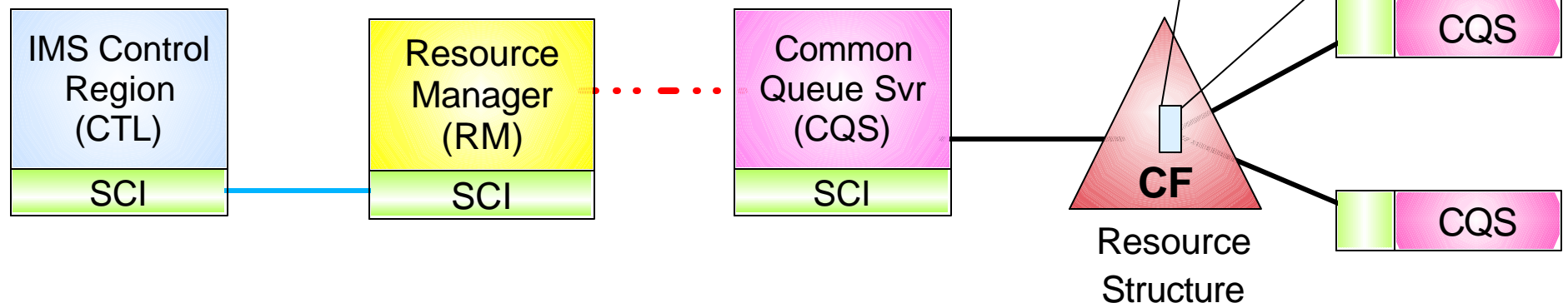
Sysplex Terminal Management

★ Resource type consistency

★ Resouce name uniqueness

★ Resource status recovery

Shared Resources

Many IMSplex resources are shared

Shared Queues

Data Sharing

Descriptor Name

CF

APPC

CPI-C Transaction

Static

Node
(Static node user)
Lterm
Userid

IMSplex

IMS1

IMS2

IMS3

Transactions

Single Session

ISC

Node
(Static node user)
Lterm
Userid

Dynamic

Node
User
Lterm
Userid

MSC

Msname

Parallel Sessions

ISC

Node
User
Lterm
Userid

Online Change Libraries

IMS
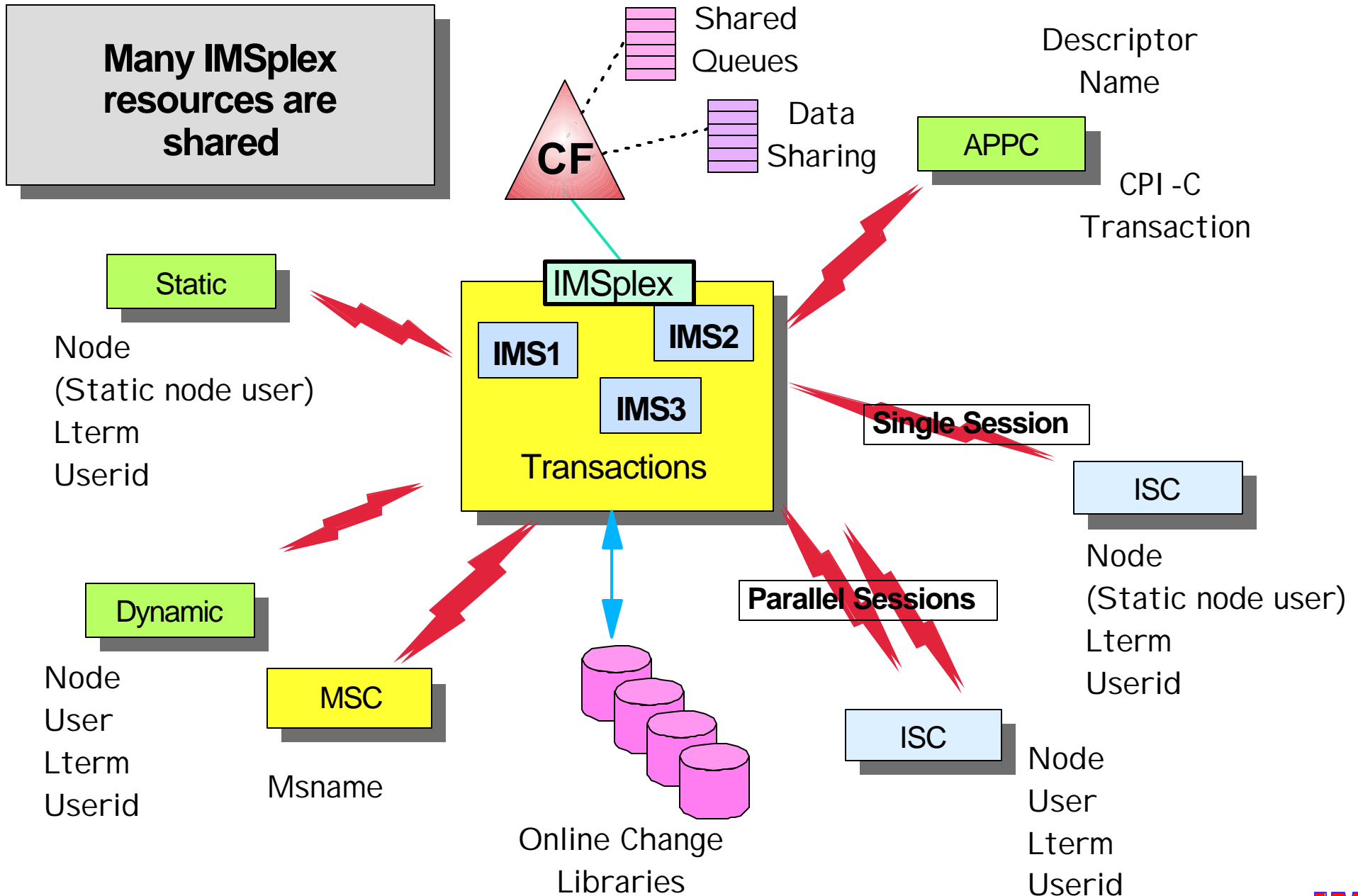
Resource Structure

Resource structure contains global resource information for uniquely named resources

- ► Transactions
- ► Nodes, lterms, users, userids, msnames, APPC descriptors
- ► Global processes
- ► IMSplex local and global information

Resource structure is optional

- ► Defined in CFRM Policy (if used)
- ► If no resource structure defined
  - Terminal/user resource status saved locally; cannot be shared
  - Sysplex terminal management disabled
- ► Resource structure not required for global online change

Resource List Structure
Transactions
Lterms
Msnames
Users
Nodes
Userids
Processes
IMSplex

Resource Entries
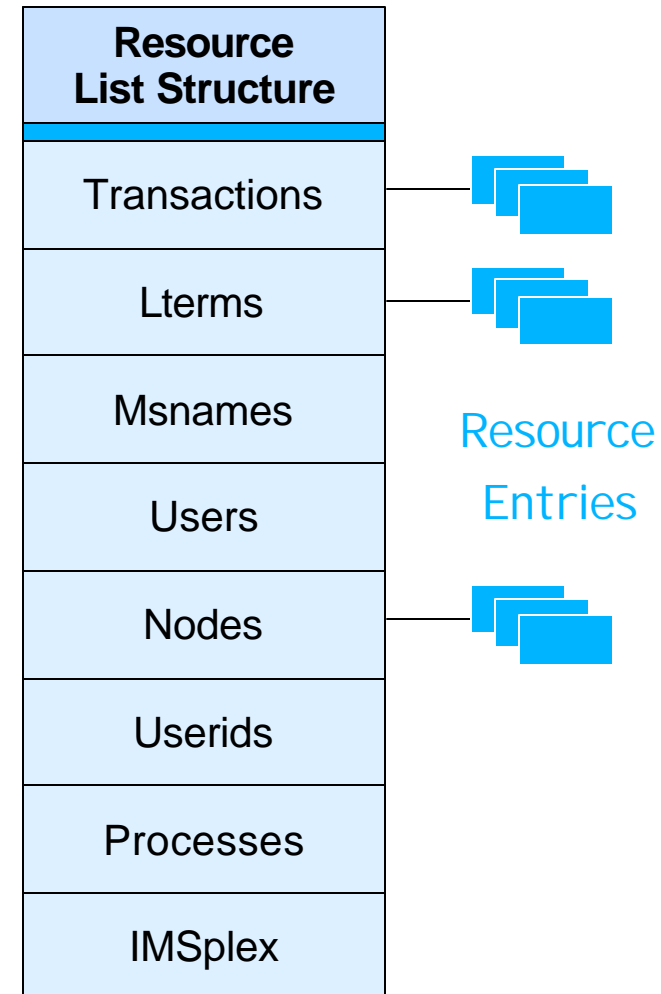
Sysplex Terminal Management

Enables improved systems management in an IMSplex by sharing resource status information

- ► Applies to **VTAM** terminal and user resources
  - • BTAM and OTMA resources not supported

Global resource sharing requires the resource manager, a resource structure, and shared queues

- ► Resource names and status saved in structure
- ► Shared by all IMSs in IMSplex

Without a resource structure, user can opt for ...

- ► Local status recovery
  - • Same as pre-V8
- ► No status recovery
  - • New function in V8

IMS

Sysplex Terminal Management ...

Sysplex terminal management objectives

► Enforce global *resource type consistency*

- Prevent naming inconsistencies between IMSs

► Enforce global *resource name uniqueness*

- Prevent multiple logon / signon within the IMSplex

► Enable global *terminal and user resource status recovery*

- Resume significant status on another IMS after failure
  - Conversation, fast path response, STSN sequence numbers
  - Command status (e.g., stopped, assigned, ...)
- Reduce need for IMS-managed VGR affinity

► Enable *global callable services*

- User exits can access terminal and user information across IMSplex

Resource Type Consistency

Prevents the same _resource name_ from being used for different message destination _resource types_

- ► For example, don't allow IMS1 to define transaction PRSNL and IMS2 to define Lterm PRSNL

Applies to _message destinations_

- ► _Transaction names - static, dynamic, and CPI-C_
- ► _Lterm names_
- ► _Msnames_
- ► _APPC descriptor (lterm) names_

These are all Shared Queue destination names. !

Does not apply to

- ► Nodes, users, userids
- ► These are not message queue "destinations"
  - • For example, OK to have node name and lterm name the same

IMS

Resource Type Consistency

Shared Queue
Structure

TRANQ	→ PRSNL Data
	?
LTERMQ	→ PRSNL Data

IMS1

CF

IMS2

APPLCTN ...
TRANSACT PRSNL

TERMINAL
NAME PRSNL
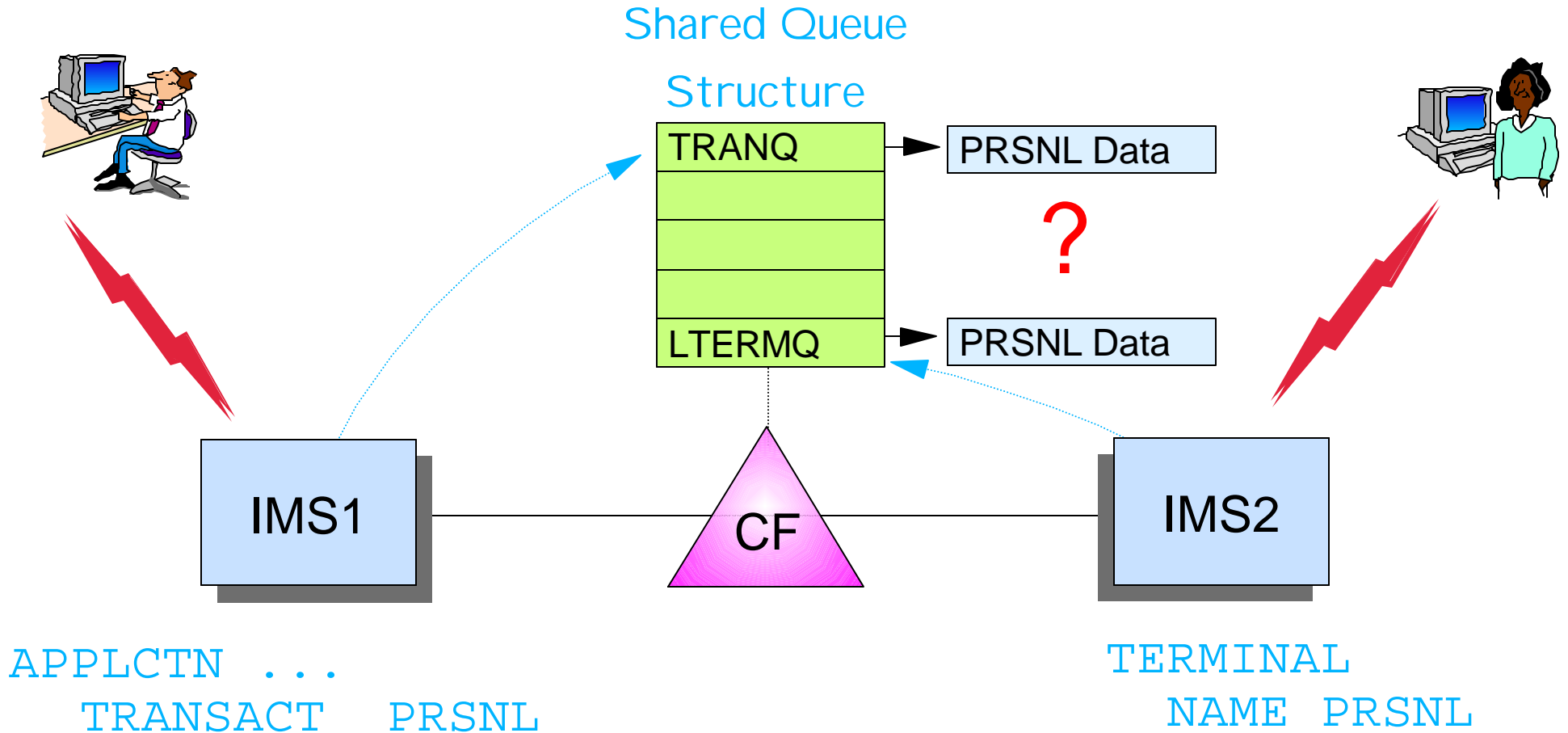
IMS1 will queue message
with destination PRSNL to
Transaction Queue.

IMS2 will queue message
with destination PRSNL to
Lterm Queue.

IMS

Resource Type Consistency ...

Shared Queue

Structure

TRANQ	→ PRSNL Data
LTERMQ	

IMS1 —— CF —— IMS2
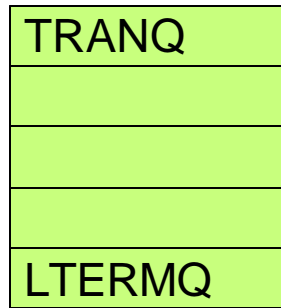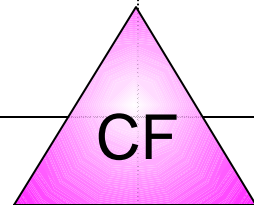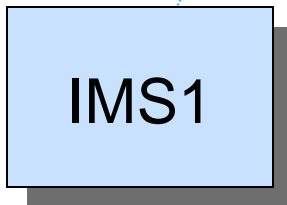
APPLCTN ...
TRANSACT PRSNL

IMS1 will create PRSNL
Transaction entry in
Resource Structure
during IMS initialization.

Resource
Structure

TRAN	→ PRSNL
MSNAME	
LTERM	
APPC DESC	✗ PRSNL
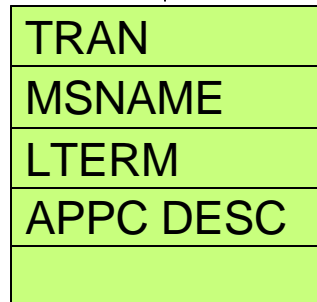
IMS2 will prevent
creation of Lterm
entry for PRSNL
since it is already
defined as a
transaction on the
resource structure.

IMS

Resource Name Uniqueness

STM prevents some resource types from being active in more than one IMS

- These resources are *owned* by one IMS while active
  - Ownership maintained in structure

Applies to

- *Single session VTAM Nodes, (ETO) Users, Lterms*
- *Userids*
  - Only if single signon requested by first IMS to join IMSplex

Does not apply to

- Transactions
- Parallel session VTAM nodes
- Msnames
- APPC descriptor names
- Userids if SGN=M

Resource Name Uniqueness ...

PERS1
PRSNL1
USER1

Shared Queue
Structure

TRANQ
LTERMQ

PERS2
PRSNL1
USER2

LOGON

SIGNON

LOGON ✗

IMS1 ——— CF ——— IMS2

If resource already active
on (owned by) IMS1 ....

Owner

NODE	PERS1	IMS1
LTERM	PRSNL1	IMS1
USER	PERS1	IMS1
USERID	USER1	IMS1

Resource
Structure

... attempt to activate
resource on IMS2 will fail.

IMS
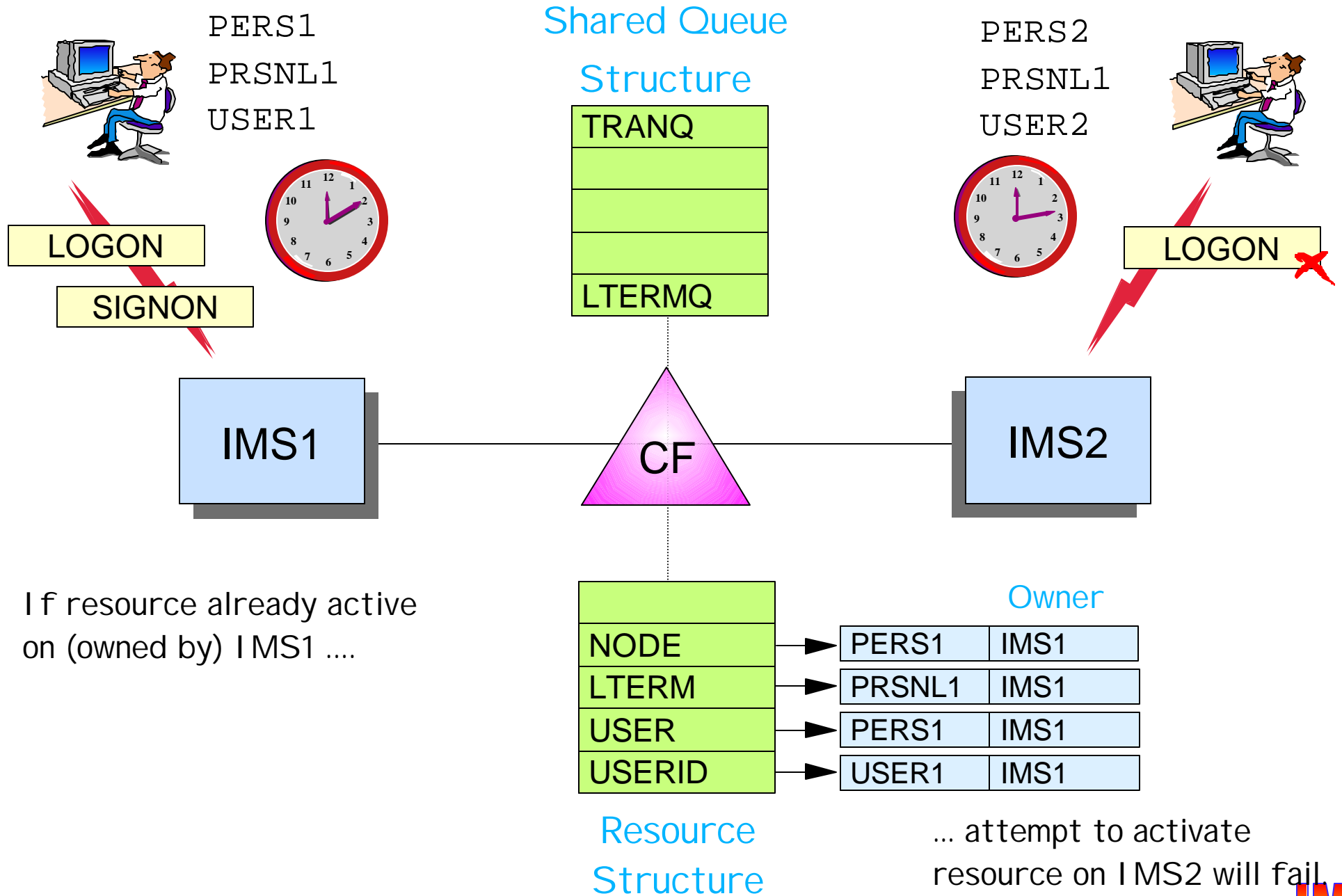
Resource Status Recovery

Recoverable status

- ► If status is known to IMS when resource reconnects
  - Recover (restore) status
- ► Saved in Resource Structure
  - Node, Iterm, or user entry

Significant status

- ► When session terminates, IMS will not delete entry if it has ...
  - End-user significant status
    - – Conversation, fast path response mode, STSN
  - Command significant status
    - – STOP, EXC, TEST MFS, TRACE
    - – ASSIGN or CHANGE USER with SAVE keyword

- ► Not all recoverable status is significant, for example ...
  - LTERM assignments made without SAVE keyword

Resource Status Recovery ...

Status recovery mode (SRM)

► Determines *where* end-user significant status is maintained

- GLOBAL - in the *resource structure*
- LOCAL - in *local control blocks*
- NONE - *deleted* when resource becomes inactive

Status recoverability (RCVYxxxx)

► Determines *if* end-user significant status should be recovered

- RCVYCONV=YES|NO
- RCVYSTSN=YES|NO
- RCVYFP=YES|NO

Set at logon or signon time

► System default set in DFSCGxxx
► Logon or Signon Exit

IMS

Status Recovery Example

Resource Structure

VGR Structure

Shared Queues Structure

IMS1

OM | SCI | RM

SCI

IMS CTL | SCI | SCI | CQS

NODEA
LTERMA

CF

IMS2

OM | SCI | RM

SCI

IMS CTL | SCI | SCI | CQS

NODEA
LTERMA

VTAM (Generic Resources)
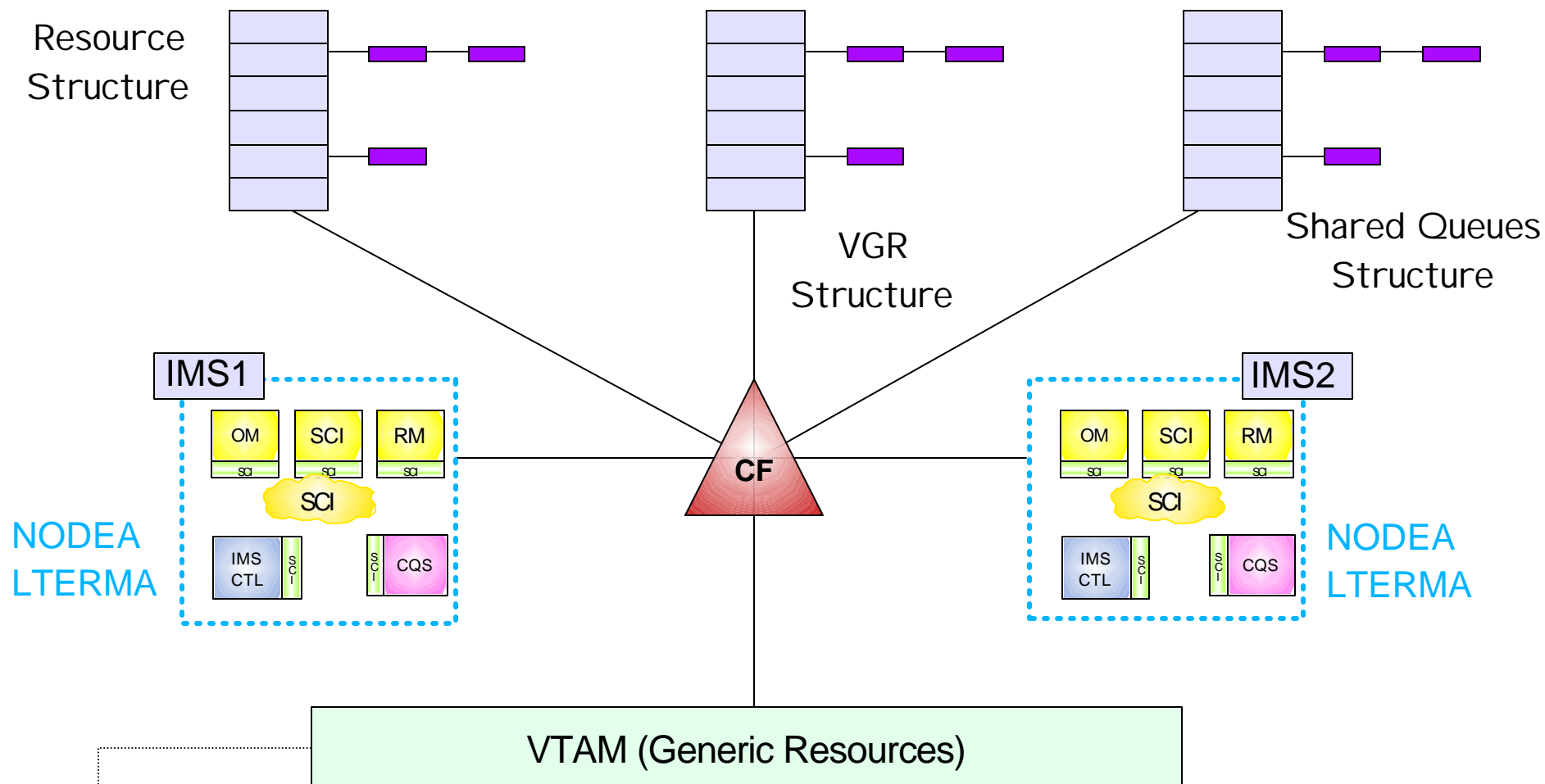
NODEA

★ Two IMSs in IMSplex (IMS1 and IMS2)
★ Both have NodeA and LtermA defined
★ Both have SRMDEF=GLOBAL
★ VTAM generic resources enabled (GRSNAME=IMSX)

Status Recovery – SRM=GLOBAL
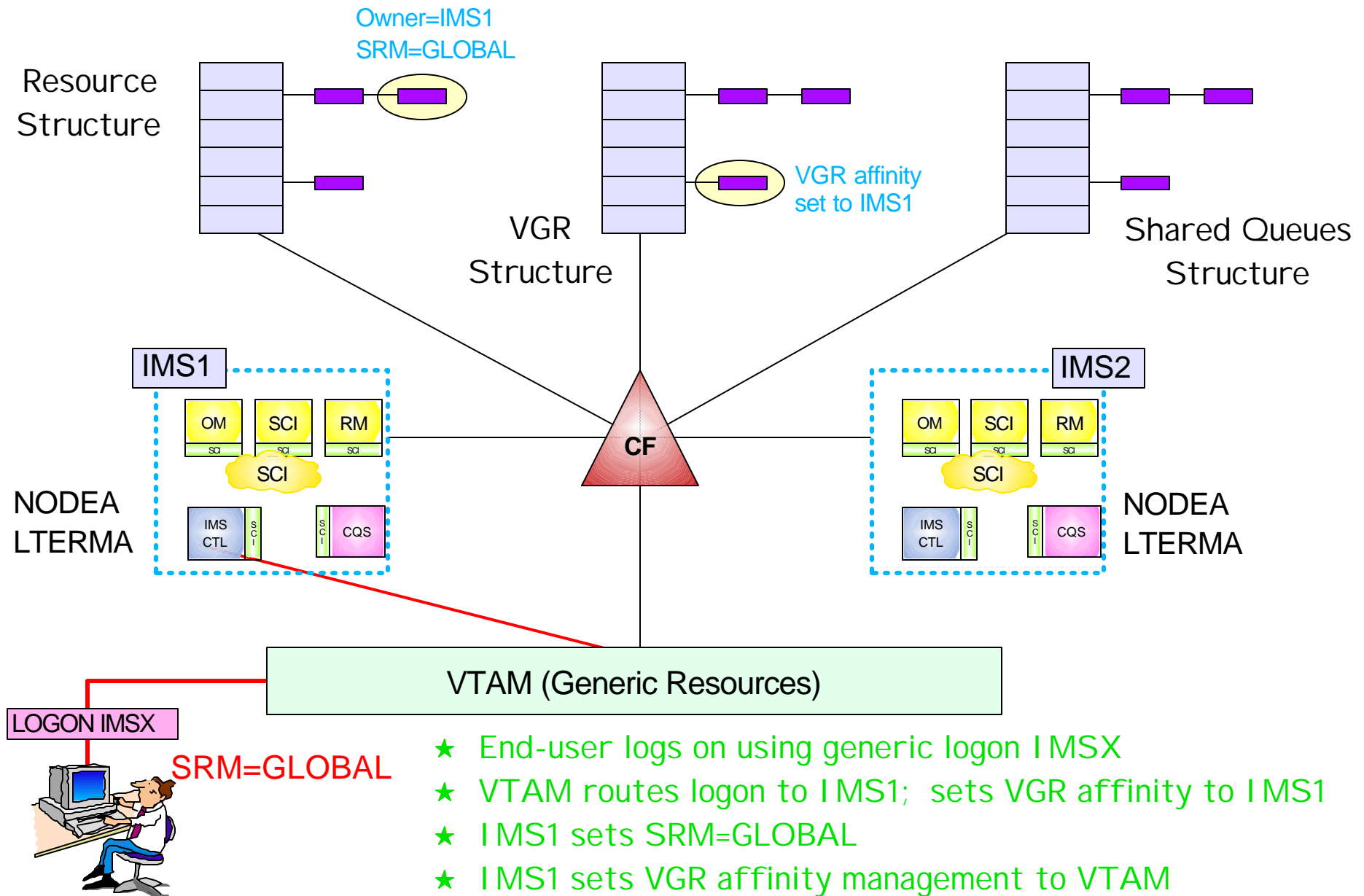
Resource Structure

Owner=IMS1
SRM=GLOBAL

VGR Structure

VGR affinity set to IMS1

Shared Queues Structure

IMS1

| OM | SCI | RM |
| SCI | SCI | SCI |

SCI

NODEA LTERMA

| IMS CTL | SCI |
| SCI | CQS |

CF

IMS2

| OM | SCI | RM |
| SCI | SCI | SCI |

SCI

NODEA LTERMA

| IMS CTL | SCI |
| SCI | CQS |

VTAM (Generic Resources)

LOGON IMSX

SRM=GLOBAL

★ End-user logs on using generic logon IMSX
★ VTAM routes logon to IMS1; sets VGR affinity to IMS1
★ IMS1 sets SRM=GLOBAL
★ IMS1 sets VGR affinity management to VTAM
★ Resource entries created: Owner=IMS1, SRM=GLOBAL

IMS

Status Recovery – SRM=GLOBAL ...

Resource Structure

Owner=IMS1
SRM=GLOBAL

Recoverable Status

VGR affinity set to IMS1

VGR Structure

Recoverable Message

Shared Queues Structure

Recoverable Status

IMS1

OM | SCI | RM
SCI | SCI | SCI

SCI

IMS CTL | SCI | SCI | CQS

CF

IMS2

OM | SCI | RM
SCI | SCI | SCI

SCI

IMS CTL | SCI | SCI | CQS

NODEA LTERMA

NODEA LTERMA

VTAM (Generic Resources)

CONV TRAN

SRM=GLOBAL

★ User enters conversational transaction
★ IMS1 creates local CCB
★ IMS1 queues SPA+MSG on SQ
★ IMS1 updates user resource with Conv-ID

IMS

Status Recovery - SRM=GLOBAL ...

Ownership cleared
SRM=GLOBAL

Recoverable Status

Resource
Structure

VGR
Structure

VGR affinity
deleted

Shared Queues
Structure

Recoverable
Message

Recoverable Status

IMS1

| OM | SCI | RM |
| SQ | SQ | SQ |

CF

IMS2

| OM | SCI | RM |
| SQ | SQ | SQ |

SCI

| IMS CTL | SCI | | CQS |

NODEA
LTERMA

| IMS CTL | SCI | | SCI | CQS |

NODEA
LTERMA

Rats!

VTAM (Generic Resources)

SRM=GLOBAL

★ IMS1 fails; IMS2 queries structure for IMS1 entries
★ IMS2 does not delete resource entry (in conversation)
★ IMS2 <u>clears ownership</u> (SRM=GLOBAL)
★ VTAM <u>deletes VGR affinity</u>
★ SPA+MSG still on SQ

Status Recovery – SRM=GLOBAL ...

Resource
Structure

Owner=IMS2
SRM=GLOBAL

Recoverable Status

VGR affinity
set to IMS2

VGR
Structure

Recoverable
Message

Shared Queues
Structure

Recoverable Status

IMS1

OM	SCI	RM
SCI		SCI

| IMS CTL | SCI | SCI | CQS |

NODEA
LTERMA

CF

IMS2

OM	SCI	RM
SCI	SCI	SCI

SCI

| IMS CTL | SCI | SCI | CQS |

Recoverable Status

NODEA
LTERMA

VTAM (Generic Resources)
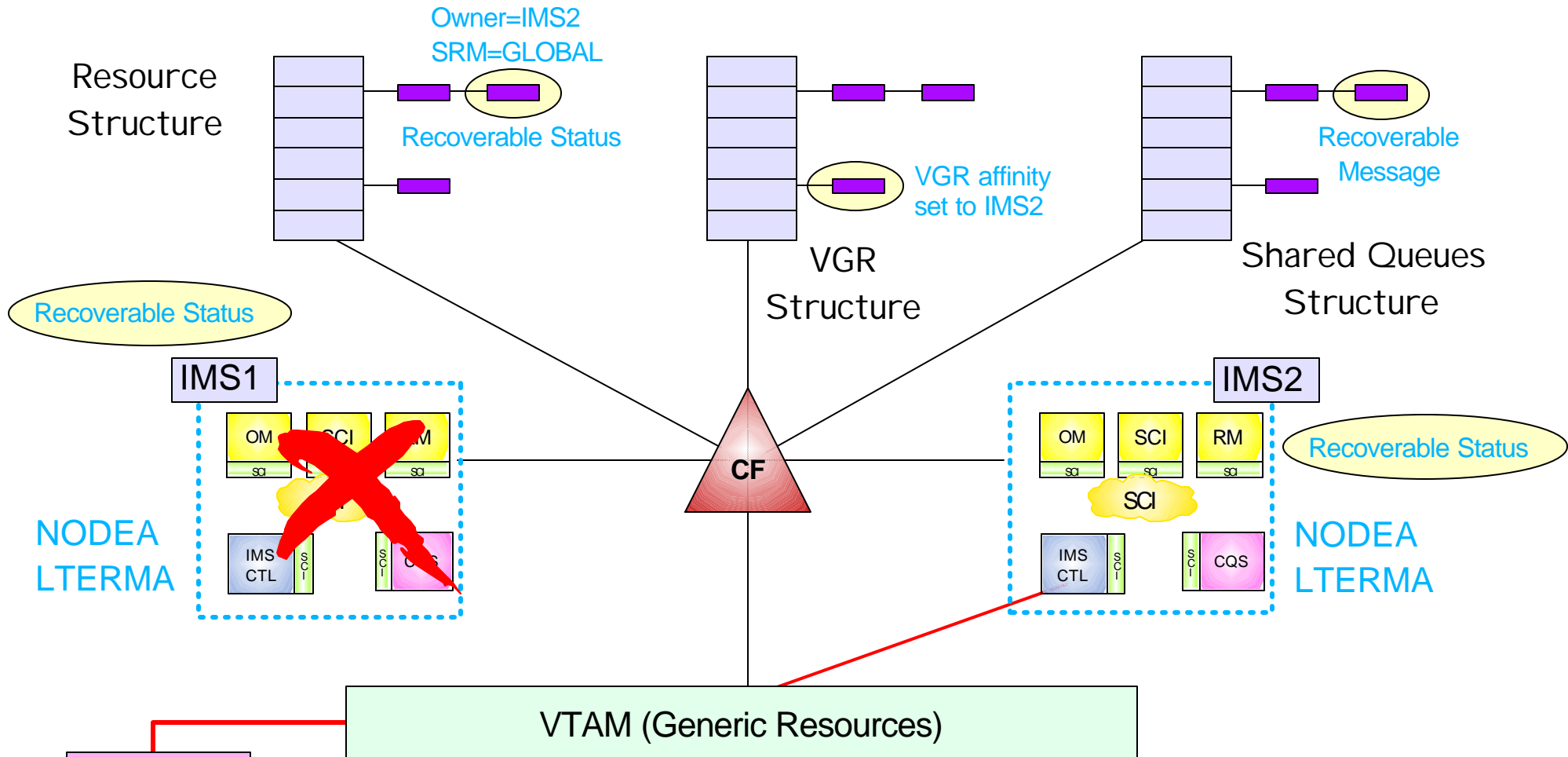
LOGON IMSX

SRM=GLOBAL

★ End-user logs on using generic logon IMSX
★ VTAM routes logon to IMS2; sets VGR affinity to IMS2
★ IMS2 sets ownership to IMS2
★ IMS2 <u>recovers conversation</u> from Resource Structure
and Shared Queue Structure

IMS

Status Recovery – SRM=GLOBAL ...

Resource Structure

Owner=IMS2
SRM=GLOBAL

Recoverable Status

VGR affinity set to IMS2

VGR Structure

Recoverable Message

Shared Queues Structure

Recoverable Status

IMS1

NODEA
LTERMA

OM SCI RM
SCI SCI SCI
SCI
IMS CTL SCI CQS

CF

IMS2

OM SCI RM
SCI SCI SCI
SCI
IMS CTL SCI CQS

Recoverable Status

NODEA
LTERMA

VTAM (Generic Resources)

SRM=GLOBAL

★ IMS1 restarts; discovers recoverable status for SRM=GLOBAL resource
★ IMS1 deletes local recoverable status

© IBM Corporation 2002

IMS

Status Recovery – SRM=LOCAL

Resource Structure

Owner=IMS1
SRM=LOCAL

VGR Structure

VGR affinity set to IMS1

Shared Queues Structure

IMS1
OM SCI RM
SCI SCI SCI
SCI
NODEA LTERMA
IMS CTL SCI SCI CQS

CF

IMS2
OM SCI RM
SCI SCI SCI
SCI
NODEA LTERMA
IMS CTL SCI SCI CQS

VTAM (Generic Resources)

LOGON IMSX

SRM=LOCAL

★ End-user logs on using generic logon IMSX
★ VTAM routes logon to IMS1; sets VGR affinity to IMS1
★ IMS1 sets SRM=LOCAL
★ IMS1 sets VGR affinity management to IMS
★ Resource entries created: Owner=IMS1, SRM=LOCAL

© IBM Corporation 2002

IMS

Status Recovery – SRM=LOCAL

Resource
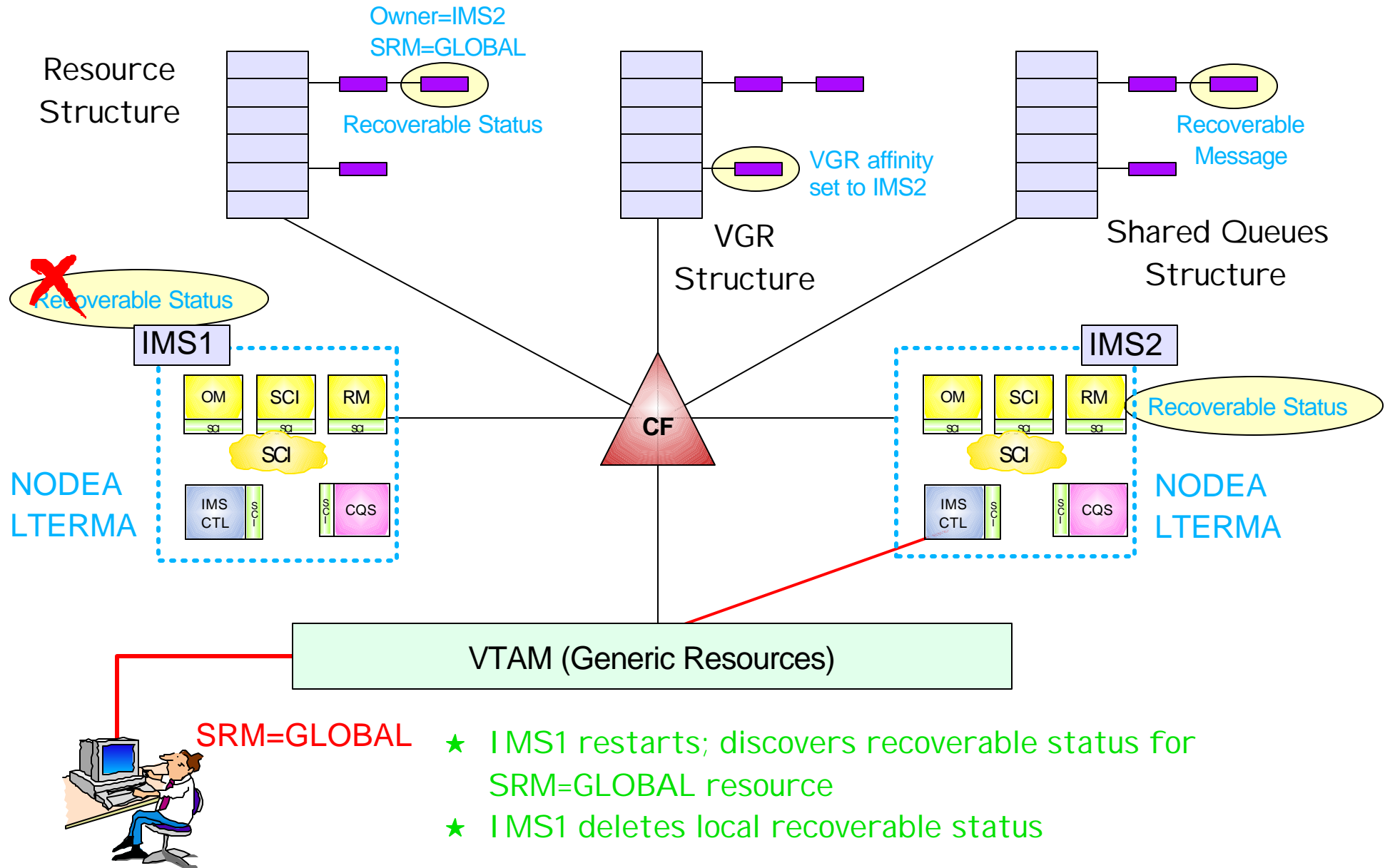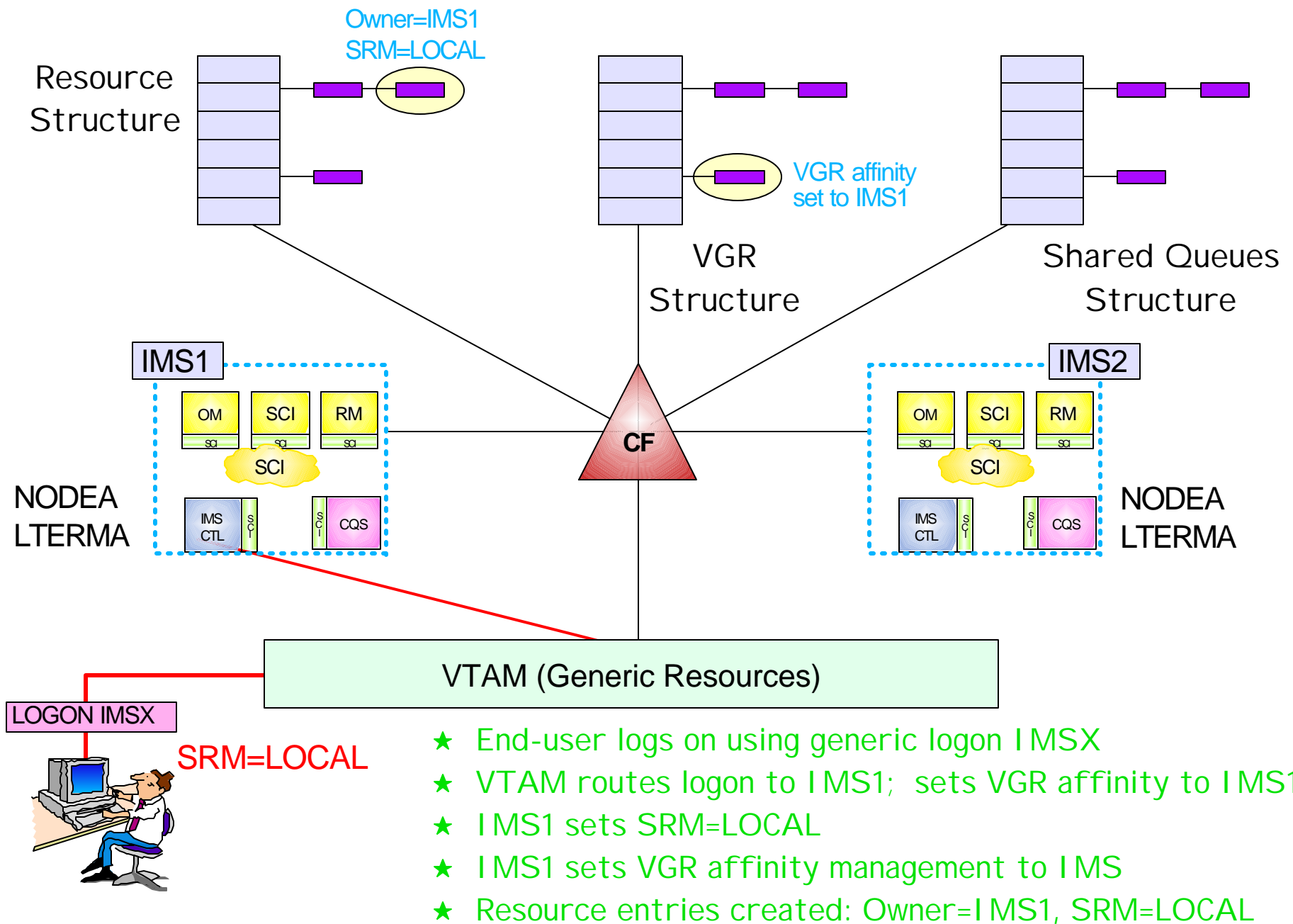Structure

Owner=IMS1
SRM=LOCAL

Recoverable
Message

Recoverable Status

VGR affinity
set to IMS1

VGR
Structure

Shared Queues
Structure

IMS1

| OM | SCI | RM |
| SCI | SCI | SCI |

SCI

NODEA
LTERMA

| IMS CTL | SCI | SCI | CQS |

CF

IMS2

| OM | SCI | RM |
| SCI | SCI | SCI |

SCI

NODEA
LTERMA

| IMS CTL | SCI | SCI | CQS |

VTAM (Generic Resources)

CONV TRAN

SRM=LOCAL

★ User enters conversational transaction

★ IMS1 creates local CCB

★ IMS1 queues SPA+MSG on SQ

★ IMS1 does not update user resource with Conv-ID
(status maintained locally)

IMS

Status Recovery - SRM=LOCAL ...

Owner=IMS1
SRM=LOCAL

Resource Structure

VGR affinity set to IMS1

VGR Structure

Recoverable Message

Shared Queues Structure

Recoverable Status
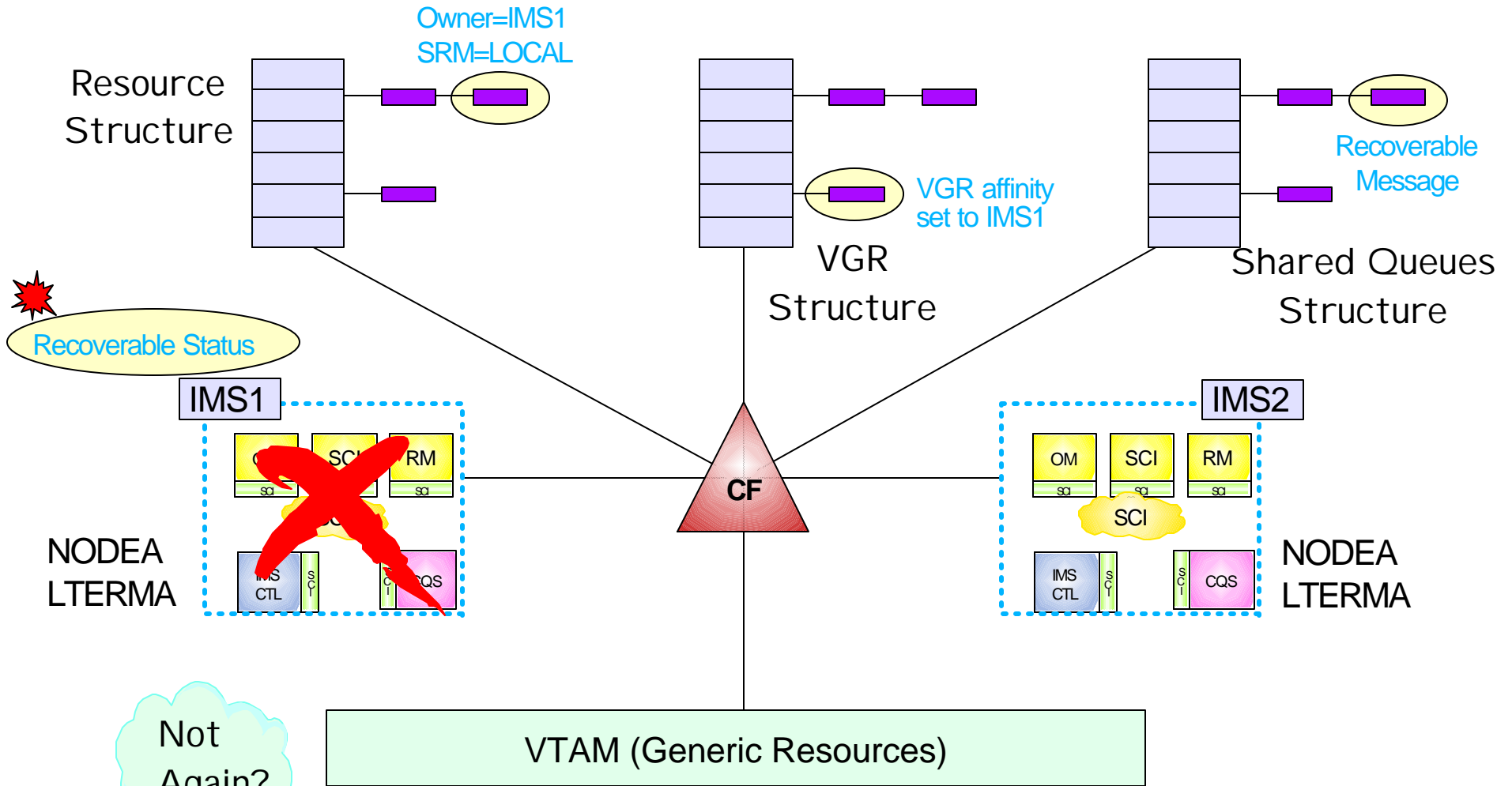
IMS1

OM   SCI   RM
SCI   SCI

IMS CTL   SCI   SCI   CQS

NODEA LTERMA

CF

IMS2

OM   SCI   RM
SCI   SCI   SCI

SCI

IMS CTL   SCI   SCI   CQS

NODEA LTERMA

Not Again?

SRM=LOCAL

VTAM (Generic Resources)

★ IMS1 fails; IMS2 queries structure for IMS1 entries
★ IMS2 does not delete resource entry (in conversation)
★ IMS2 does not clear ownership (SRM=LOCAL)
★ VTAM does not delete VGR affinity

IMS

Status Recovery – SRM=LOCAL ...

Resource Structure

Owner=IMS1
SRM=LOCAL

VGR affinity set to IMS1

VGR Structure

Recoverable Message

Shared Queues Structure

Recoverable Status

IMS1

OM SCI RM
SCI   SCI

IMS CTL SCI   CQS

NODEA
LTERMA

CF

IMS2

OM SCI RM
SCI SCI SCI

SCI

IMS CTL SCI   SCI CQS

NODEA
LTERMA

VTAM (Generic Resources)

LOGON IMSX

SRM=LOCAL

★ End-user logs on using generic logon IMSX
★ VGR affinity still set to IMS1
★ Logon fails; user must wait for IMS1 to restart

IMS

Status Recovery – SRM=LOCAL ...

Owner=IMS1
SRM=LOCAL

Resource
Structure

Recoverable Status

IMS1

NODEA
LTERMA

VGR affinity
set to IMS1

VGR
Structure

CF

OM   SCI   RM

SCI   SCI   SCI

SCI

IMS
CTL   S
C
I

S
C
I   CQS

Recoverable
Message

Shared Queues
Structure

IMS2

OM   SCI   RM

SCI   SCI   SCI

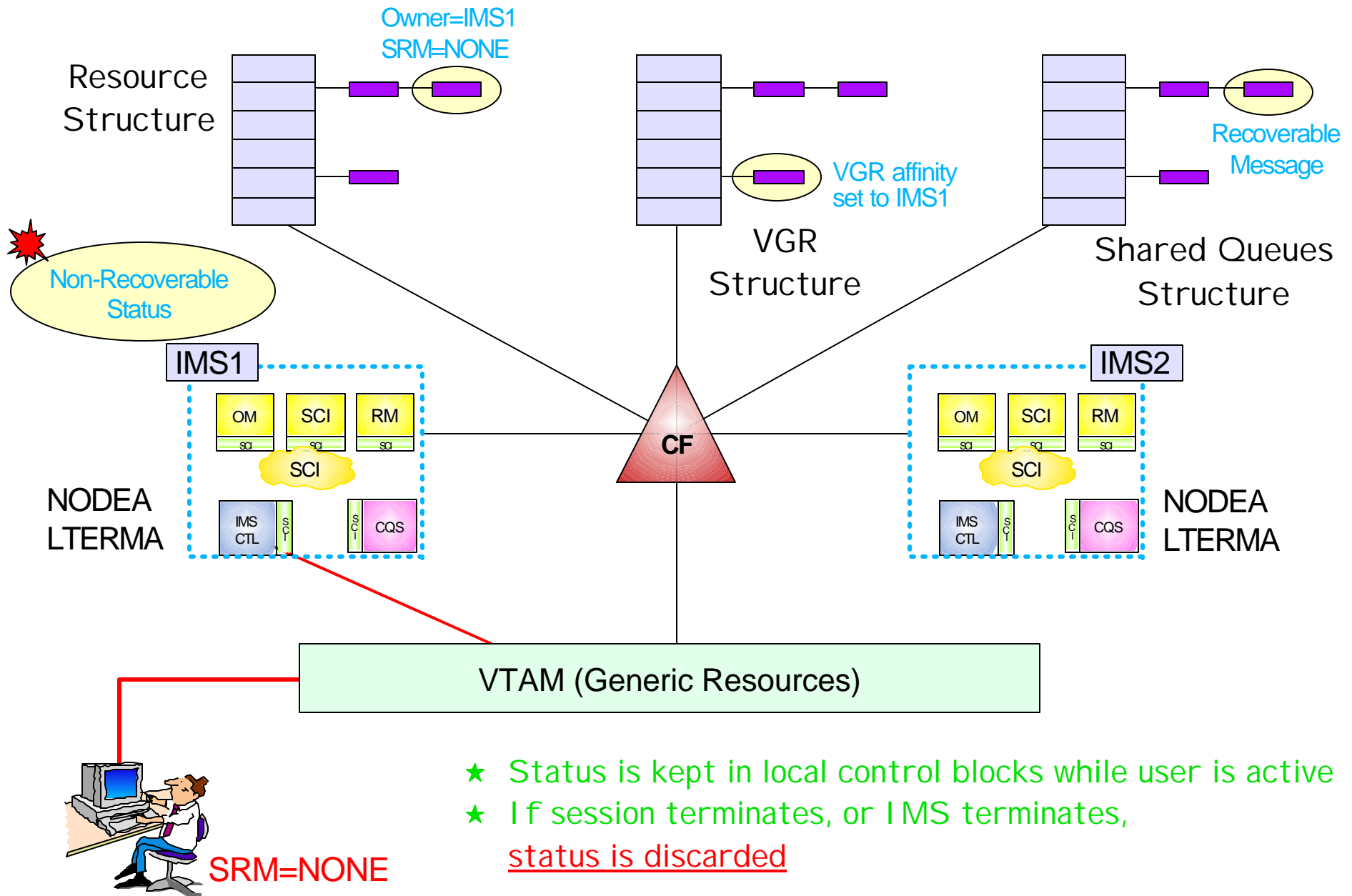SCI

IMS
CTL   S
C
I

S
C
I   CQS

NODEA
LTERMA

VTAM (Generic Resources)

LOGON IMS2

SRM=LOCAL

★ If end-user logs on directly to IMS2
★ IMS2 checks resource entry for NODEA
★ Logon rejected (NODEA owned by IMS1)
★ Logon exit can "steal" node (status is not recoverable)

IMS

Status Recovery – SRM=NONE

Owner=IMS1
SRM=NONE

Resource Structure

Non-Recoverable Status

VGR affinity set to IMS1

VGR Structure

Recoverable Message

Shared Queues Structure

IMS1

OM	SCI	RM
SCI	SCI	SCI

SCI

NODEA LTERMA

| IMS CTL | SCI | | SCI | CQS |

CF

IMS2

OM	SCI	RM
SCI	SCI	SCI

SCI

NODEA LTERMA

| IMS CTL | SCI | | SCI | CQS |

VTAM (Generic Resources)

SRM=NONE

★ Status is kept in local control blocks while user is active
★ If session terminates, or IMS terminates,
   status is discarded

IMS

CSL Highlights

Global Online Change

- ★ **Enabling G-OLC**
- ★ **Executing G-OLC**
- ★ **G-OLC commands**

IMS

Enabling Global Online Change

Global OLC enabled by DFSCGxxx Proclib member

- ► Requires CSL environment
    - Resource structure not required, but useful

- ► DFSCGxxx
    - OLC=GLOBAL | LOCAL
        - Not all IMSs in IMSplex have to participate in Global OLC

    - OLCSTAT=OLCSTAT data set name
        - OLCSTAT data set replaces MODSTAT
        - All IMSs with OLC=GLOBAL must use same OLCSTAT data set
        - IMSs with OLC=LOCAL continue to use MODSTAT

    - NORSCCC=(MODBLKS,ACBLIB,FORMAT)
        - Turns OFF online change data set name consistency checking for these data sets
        - Unless turned off, all IMSs must use same OLC data sets

IMS

Enabling Global Online Change …

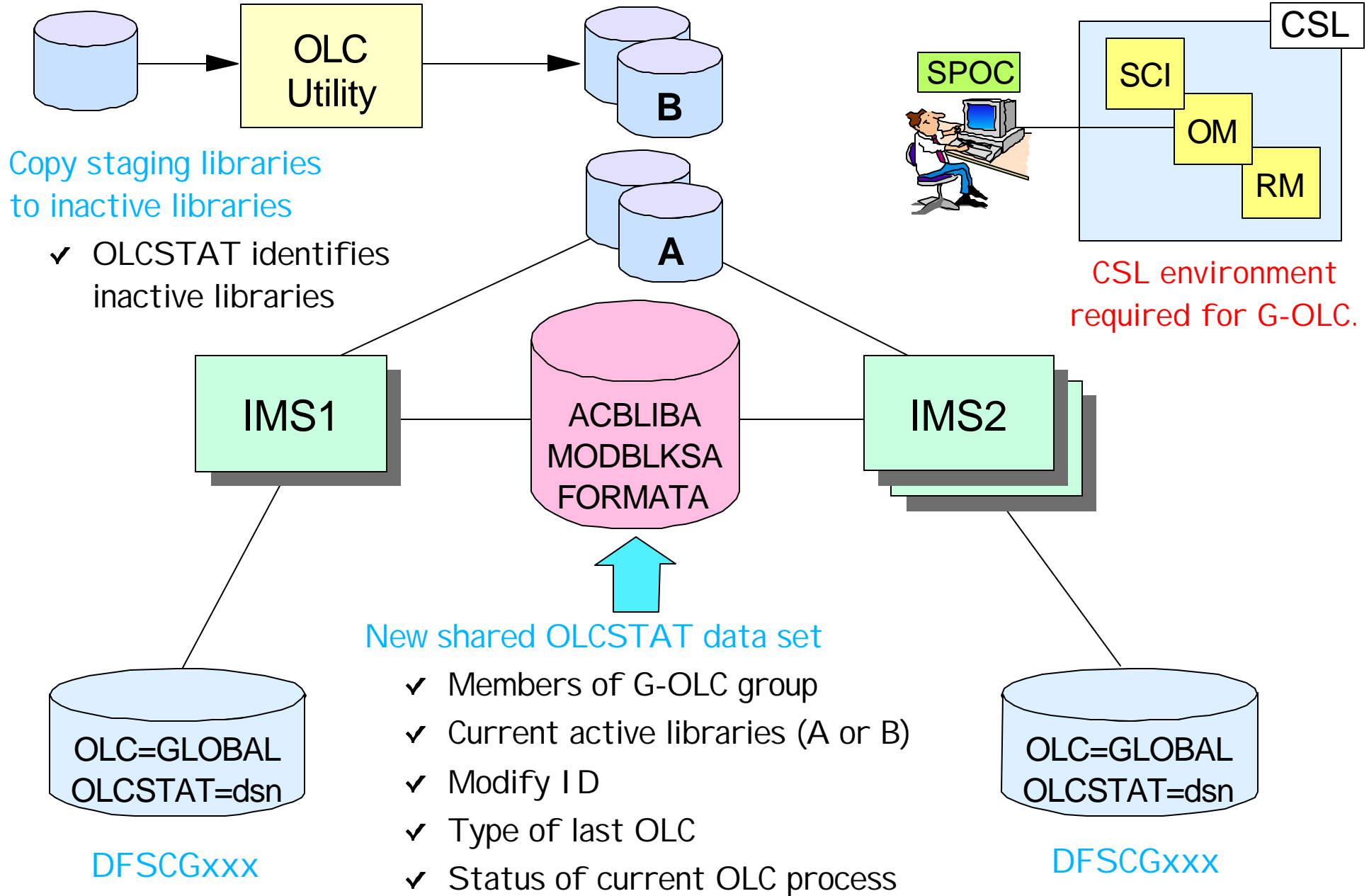## OLCSTAT data set

► Must be initialized with Global OLC Utility (DFSUOLC0)
  - Sets initial OLC library suffixes (A or B)

► Header record
  - Current active library suffixes (A or B)
  - Modify ID of last successful G-OLC
  - Type of last successful G-OLC
  - G-OLC in progress flag

► IMS record
  - One for each IMS with OLC=GLOBAL
  - Created as each IMS cold starts
  - Deleted if IMS shutdown with /CHE FREEZE LEAVEPLEX
  - Deleted if IMS "misses" a global online change
    - May require cold start

IMS

G-OLC: Before OLC Begins

OLC Utility

B

A

Copy staging libraries to inactive libraries
- ✓ OLCSTAT identifies inactive libraries

SPOC

CSL

SCI

OM

RM

CSL environment required for G-OLC.

IMS1

IMS2

ACBLIBA
MODBLKSA
FORMATA

New shared OLCSTAT data set
- ✓ Members of G-OLC group
- ✓ Current active libraries (A or B)
- ✓ Modify ID
- ✓ Type of last OLC
- ✓ Status of current OLC process

OLC=GLOBAL
OLCSTAT=dsn

DFSCGxxx

OLC=GLOBAL
OLCSTAT=dsn

DFSCGxxx

IMS

Executing Global Online Change
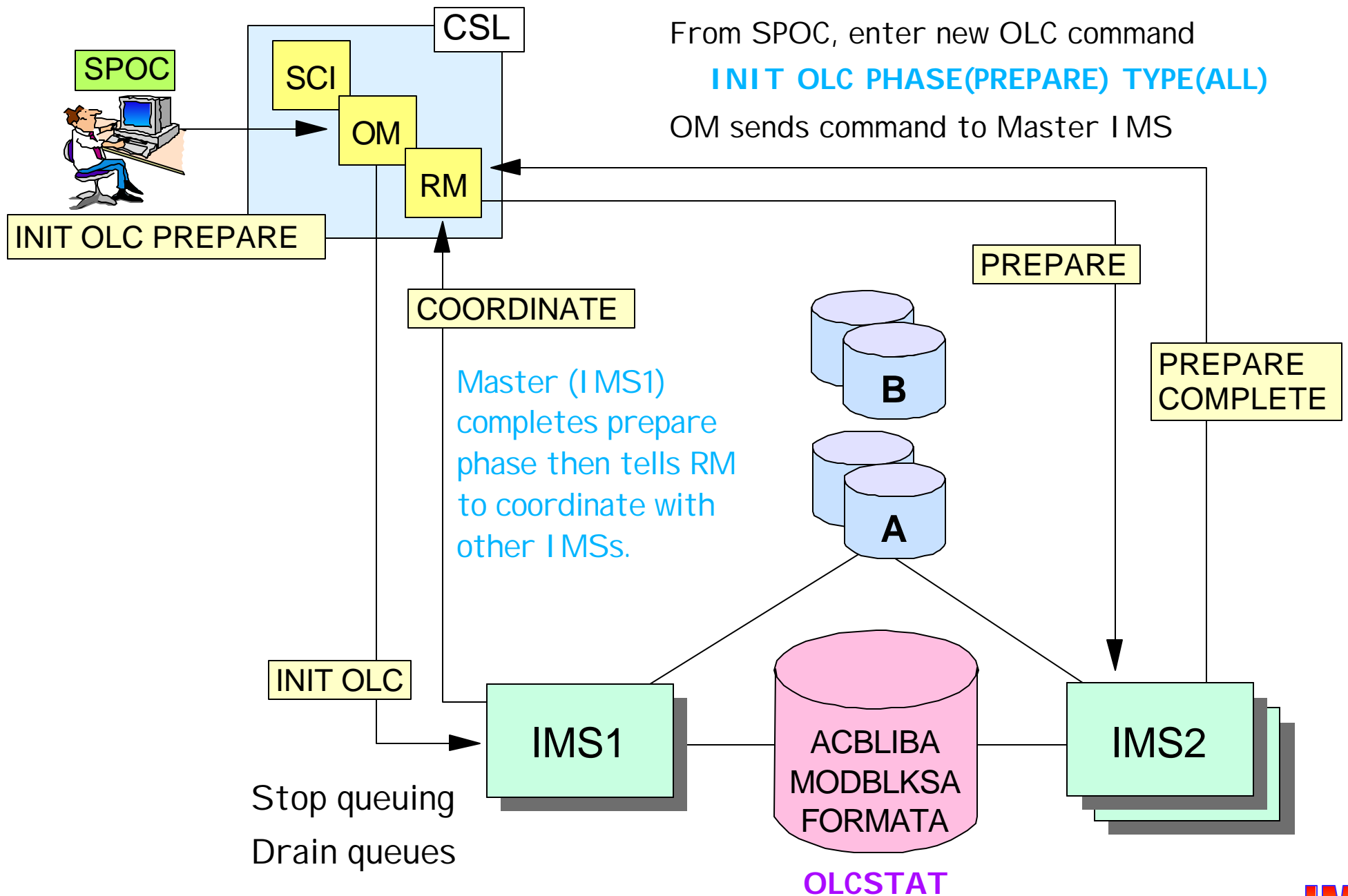
INITIATE OLC PHASE(PREPARE) TYPE(ALL|...)

- ► Command entered only through OM interface
- ► All IMSs execute PREPARE phase
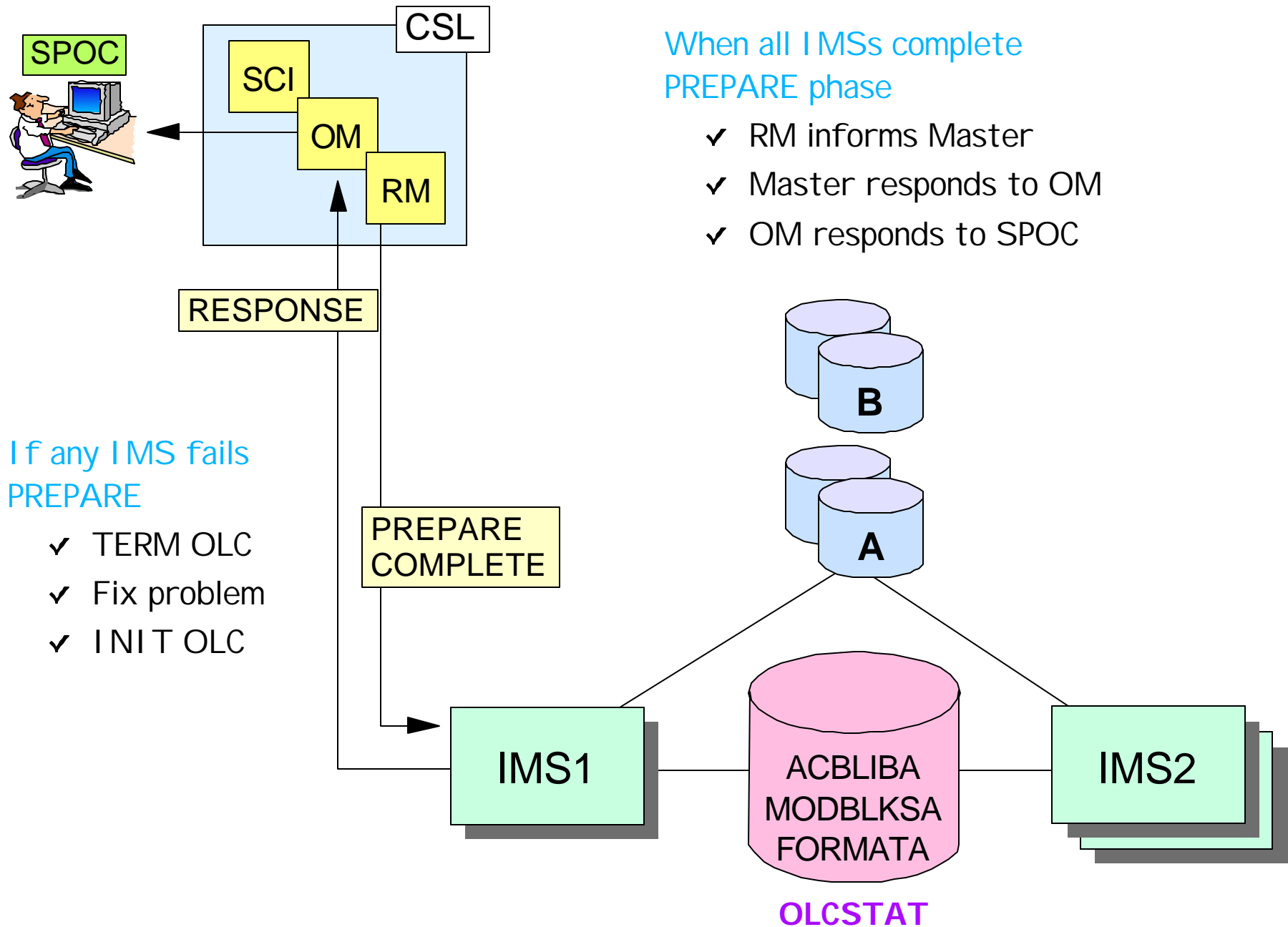 - Stop queuing; drain queues

INITIATE OLC PHASE(COMMIT)

- ► All IMSs execute commit phase 1
  - Stop scheduling
- ► All IMSs execute commit phase 2
  - Switch libraries and resume scheduling
- ► All IMSs execute commit phase 3
  - Cleanup

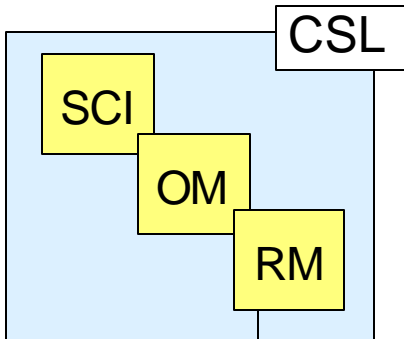> Resource Manager coordinates all Prepare and Commit processing

IMS

G-OLC: Prepare Phase

CSL

SPOC

SCI

OM

RM

INIT OLC PREPARE

From SPOC, enter new OLC command

INIT OLC PHASE(PREPARE) TYPE(ALL)

OM sends command to Master IMS

PREPARE

COORDINATE

PREPARE
COMPLETE

Master (IMS1)
completes prepare
phase then tells RM
to coordinate with
other IMSs.

B

A

INIT OLC

IMS1

Stop queuing

Drain queues

ACBLIBA
MODBLKSA
FORMATA

OLCSTAT

IMS2

IMS

G-OLC: Prepare Phase Complete

CSL

SPOC

SCI

OM

RM

RESPONSE

When all IMSs complete PREPARE phase

- ✔ RM informs Master
- ✔ Master responds to OM
- ✔ OM responds to SPOC

B

A

If any IMS fails PREPARE

- ✔ TERM OLC
- ✔ Fix problem
- ✔ INIT OLC

PREPARE COMPLETE

IMS1

ACBLIBA
MODBLKSA
FORMATA

IMS2

OLCSTAT

IMS

G-OLC: Commit Phase 1

SPOC

CSL

SCI

OM

RM

INIT OLC COMMIT

COMMIT PHASE 1

B

A

Master performs commit phase 1 and signals RM to coordinate process with other IMSs.

COORDINATE PHASE 1

PHASE 1 COMPLETE or FAILED

IMS1

ACBLIBA
MODBLKSA
FORMATA

IMS2

Stop Scheduling

OLCSTAT

IMS

G-OLC: Commit Phase 1 Complete
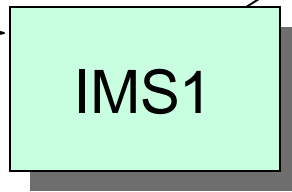
SPOC

CSL

SCI

OM

RM

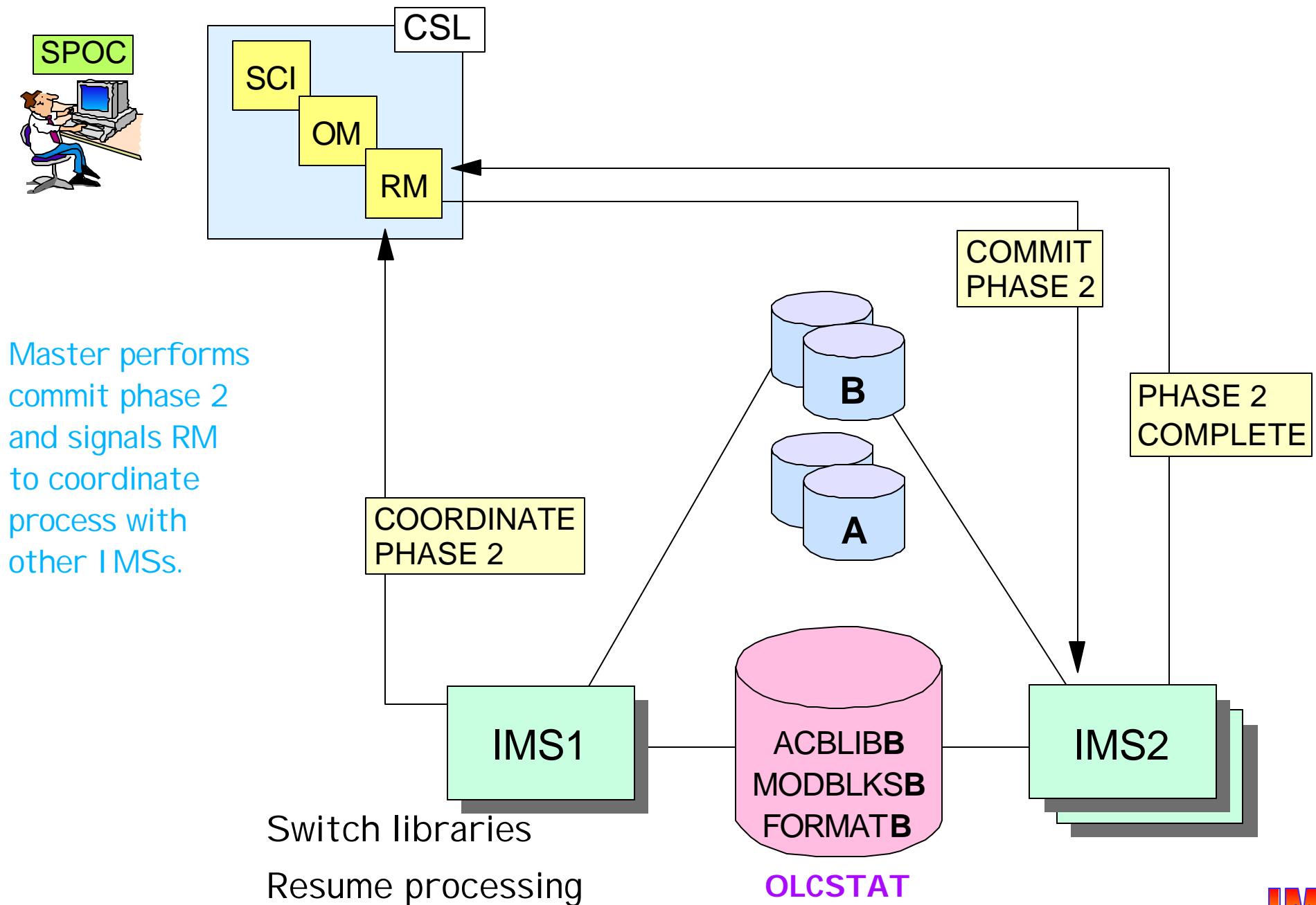**If any IMS fails phase 1**
- ✔ OLC aborted

If all successful, Master updates OLCSTAT

- ✔ New suffixes
- ✔ OLC status for each IMS
- ✔ OLC cannot be terminated after OLCSTAT updates
- ✔ Signal RM to coordinate phase 2

PHASE 1 COMPLETE

B

A

IMS1

ACBLIB**B**
MODBLKS**B**
FORMAT**B**

IMS2

OLCSTAT

IMS

G-OLC: Commit Phase 2

SPOC

CSL

SCI

OM

RM

COMMIT PHASE 2

Master performs commit phase 2 and signals RM to coordinate process with other IMSs.

B

A

PHASE 2 COMPLETE

COORDINATE PHASE 2

IMS1

ACBLIB**B**
MODBLKS**B**
FORMAT**B**

IMS2

Switch libraries

Resume processing

OLCSTAT

IMS
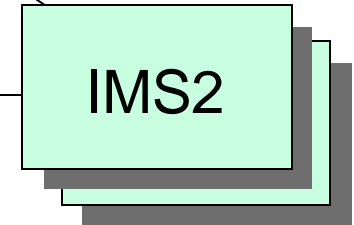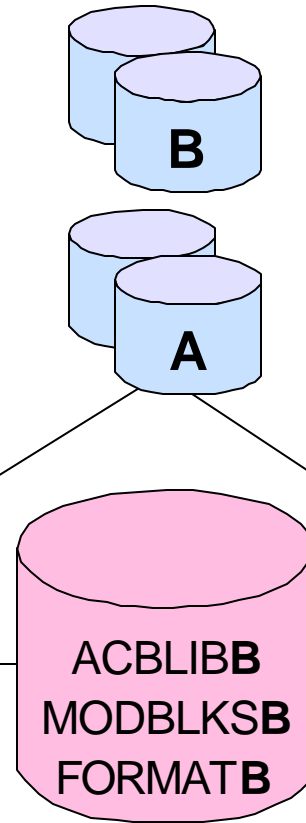
Global Online Change Status

QUERY MEMBER TYPE(IMS) SHOW(ALL)

► Displays current OLC status of each IMS

```
Response for: QUERY MEMBER TYPE(IMS) SHOW(ALL)


MbrName      CC TYPE   STATUS                LclAttr LclStat
IMS1          0 IMS    OLCPREPC,OLCMSTR
IMS1          0 IMS                          GBLOLC  OLCCMT1C
IMS2          0 IMS                          GBLOLC  OLCCMT1C
IMS3          0 IMS                          GBLOLC  OLCPREPC
IMS4          0 IMS                          LCLOLC
```

/DIS MODIFY shows local status

► OLC libraries

► Work in progress

► Resources to be added, changed, and deleted
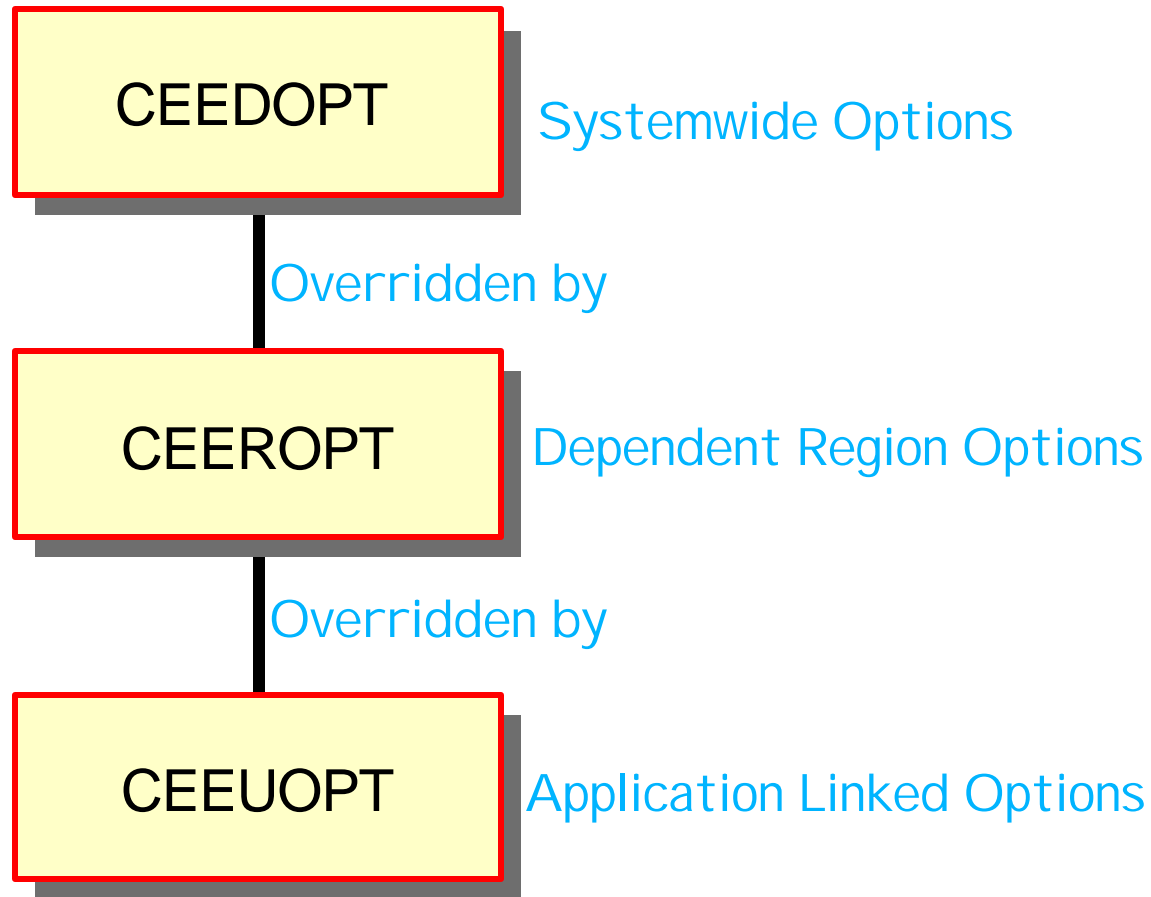
IMS

CSL Highlights

Dynamic LE runtime options

Automatic RECON loss notification

Language Environment RunTime Options

LE runtime options for IMS programs are set at the system, dependent region, or application program level

```
┌─────────────┐
│   CEEDOPT   │   Systemwide Options
└─────────────┘
       │
  Overridden by
       │
┌─────────────┐
│   CEEROPT   │   Dependent Region Options
└─────────────┘
       │
  Overridden by
       │
┌─────────────┐
│   CEEUOPT   │   Application Linked Options
└─────────────┘
```
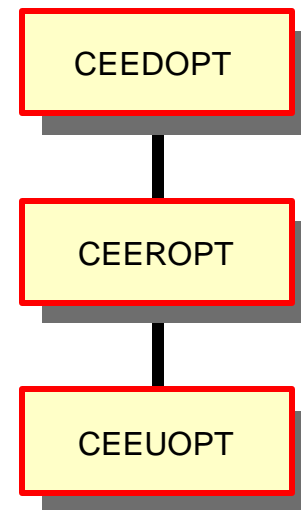
LE RunTime Options ...

LE run-time options sometimes need to be changed

- ► To collect problem identification information
  - Produce a dump
  - Collect trace data
  - Invoke a debug tool
- ► To change the storage options for a transaction

Adding or changing LE run-time options prior to IMS V8 requires one or more of the following

- ► Recompile and relink the LE modules used to supply run-time options (CEEDOPT)
- ► Stop and restart the dependent region with new/changed run-time options (CEEROPT)
- ► Recompile and relink the application containing run-time options (CEEUPOT)

CEEDOPT

CEEROPT

CEEUOPT

IMS

LE Dynamic Run-Time Options

IMS V8 provides the ability to dynamically update LE run-time options

- ► Eliminates the need to
  - Stop/start dependent regions
  - Recompile and relink application programs or LE modules

IMS V8 dynamic run-time option support

- ► Is enabled or disabled by either of the following
  - DFSCGxxx parameter: LEOPT=Y|N
  - IMSplex command: UPD LE SET(LEOPT(YES|NO)
- ► Requires IMSplex configuration with CSL
  - TSO SPOC to enter command
  - OM to route UPD LE command to IMS
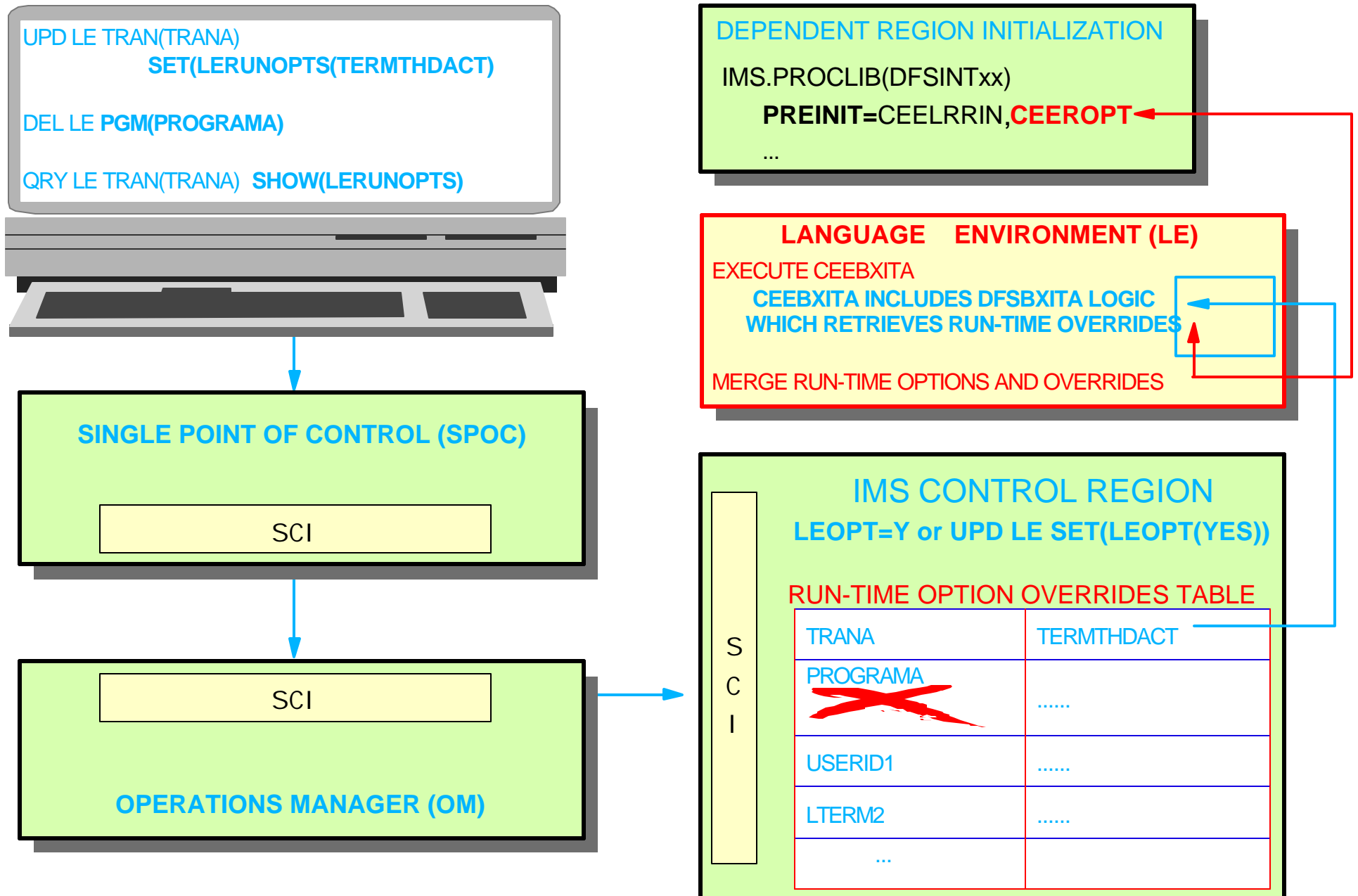
LE Dynamic Run-Time Options

Three new IMSplex commands

- ► **UPDATE LE** and **DELETE LE**
  - Commands used to enter/delete the run-time option *overrides* for a transaction, logical terminal (LTERM), userid, and/or program
- ► **QUERY LE**
  - Command used to show the run-time options *overrides* for a transaction, logical terminal (LTERM), userid, and/or program

New entry point into CEEBXITA

- ► **DFSBXITA**
  - Retrieves and causes LE to use the run-time option *overrides* supplied by the UPDATE LE and DELETE LE commands

Run-time Options Override Illustration

UPD LE TRAN(TRANA)
> **SET(LERUNOPTS(TERMTHDACT)**

DEL LE **PGM(PROGRAMA)**

QRY LE TRAN(TRANA) **SHOW(LERUNOPTS)**

DEPENDENT REGION INITIALIZATION

IMS.PROCLIB(DFSINTxx)
> **PREINIT=**CEELRRIN,**CEEROPT**

> ...

LANGUAGE   ENVIRONMENT (LE)

EXECUTE CEEBXITA
> **CEEBXITA INCLUDES DFSBXITA LOGIC**
> **WHICH RETRIEVES RUN-TIME OVERRIDES**

MERGE RUN-TIME OPTIONS AND OVERRIDES

SINGLE POINT OF CONTROL (SPOC)

SCI

OPERATIONS MANAGER (OM)

SCI

IMS CONTROL REGION
LEOPT=Y or UPD LE SET(LEOPT(YES))

S C I

RUN-TIME OPTION OVERRIDES TABLE

TRANA	TERMTHDACT
PROGRAMA	......
USERID1	......
LTERM2	......
...	

IMS

Automatic RECON Loss Notification

RECON reconfiguration with previous IMS Releases

- ► When IMS subsystem detects bad RECON, it begins reconfiguration process

  - Copies good RECON to spare

  - IMS V7 writes message identifying subsystems with RECONs open

- ► To create new spaer bad RECON must be deleted and redefined

  - Deletion requires deallocation by each subsystem

    - − Subsystem's reconfiguration process deallocates bad RECON

    - − Reconfiguration done when discovered at next RECON access

IMS

ARLN ...

Automatic RECON Loss Notification (ARLN)

► *Option* in IMS V8 to make reconfiguration by other systems immediate and automatic

DBRC instances join IMSplex

► Register with SCI
  • IMSPLEX=plexname execution parameter
  • DSPSCIX0 exit

► All DBRC types supported
  • Online DBRC, DBRC batch utility (DFSURX00), Batch w/DBRC, IMS DB utility w/DBRC

► IMSplex name stored in RECON header
  • All DBRCs using same RECONs register using same IMSplex name
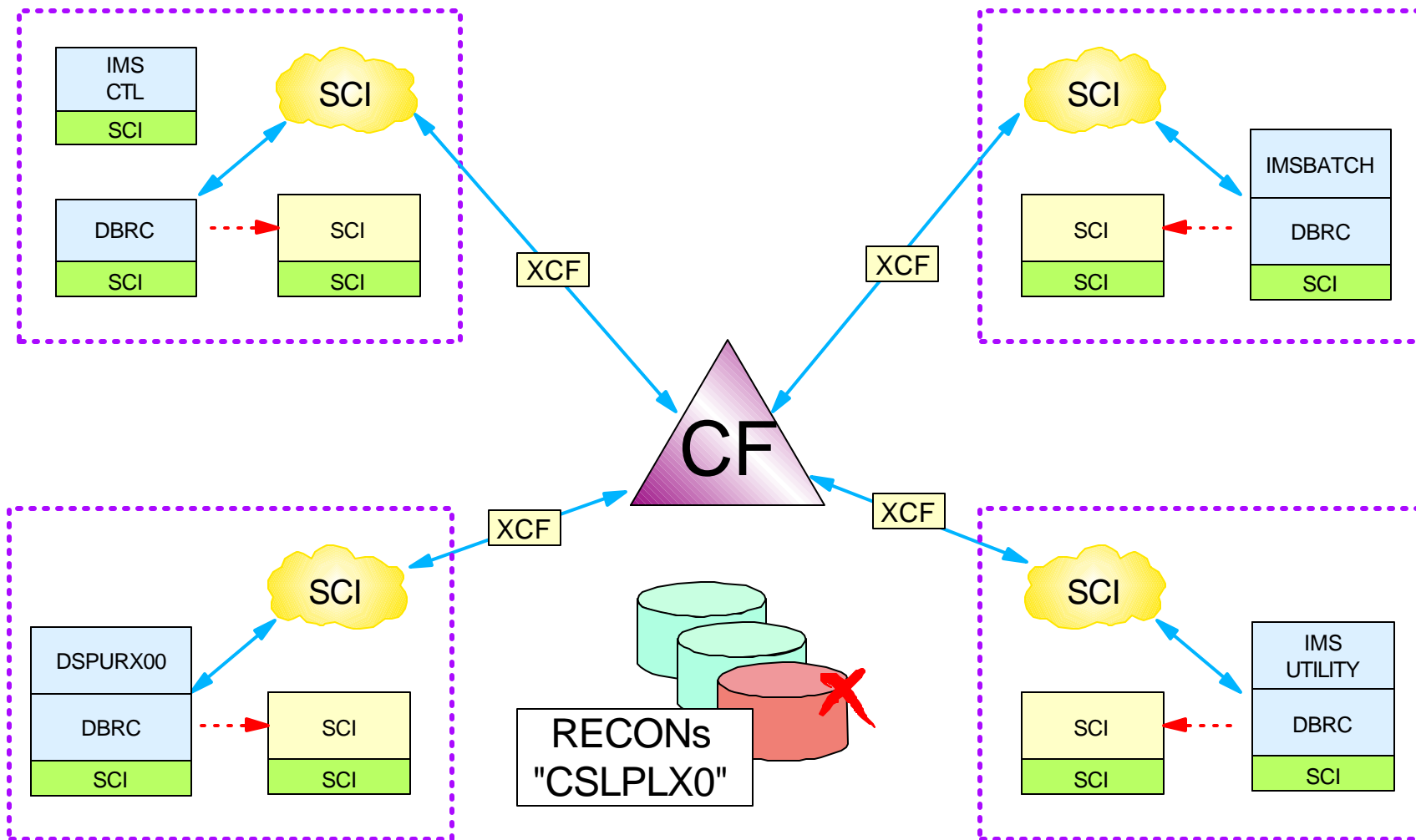
IMS

ARLN …

The Structured Call Interface (SCI) is required

- ► To join IMSplex

- ► To communicate between DBRCs

  - DBRC initiating reconfiguration notifies other DBRC members of IMSplex (using SCI)

  - Other DBRCs invoke reconfiguration process immediately

    - Eliminates wait for next access to RECONs

IMS

ARLN ...

DBRC with SCI

► Only DBRC needs to register with SCI

IMS V8 Part III Review
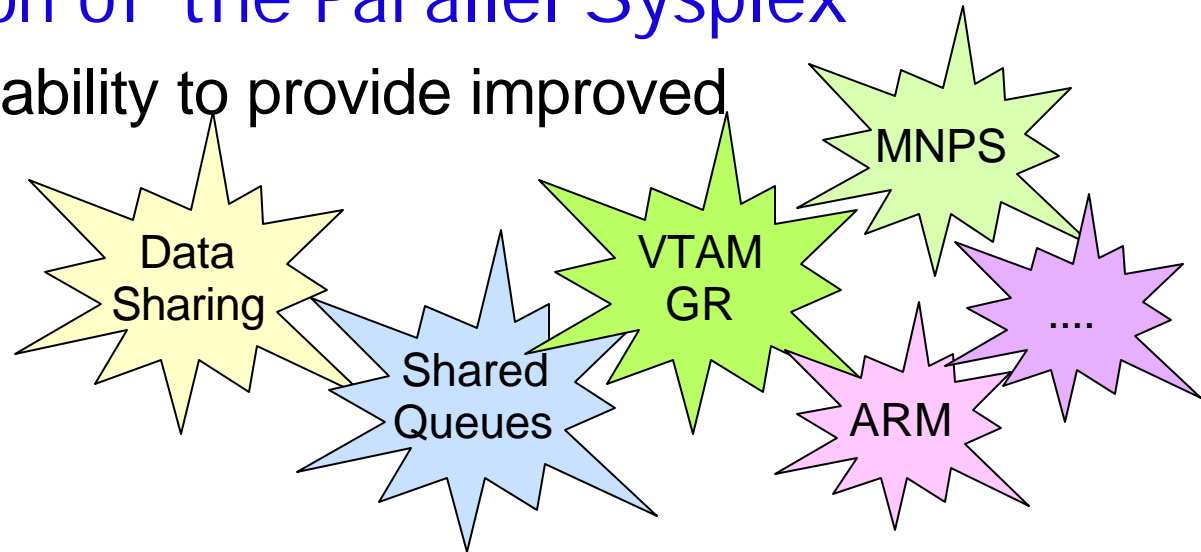
CSL

- ★ **Summary** ✦
- ★ **Migration**

IMS in a Parallel Sysplex

IMS's exploitation of the Parallel Sysplex

► Increased IMS's ability to provide improved

- Capacity
- Performance
- Availability

- but ...

Data Sharing

Shared Queues

VTAM GR

MNPS

ARM

....

► Added to the complexity of managing IMS systems in the parallel sysplex

NODE

USER

USERID

- Resource Management
  - Managing resource activity across multiple IMSs
  - Restoring end-used status when switching IMSs

LTERM

/START

/STOP

- Operations Management
  - Controlling the operations of multiple IMSs from a single entry point
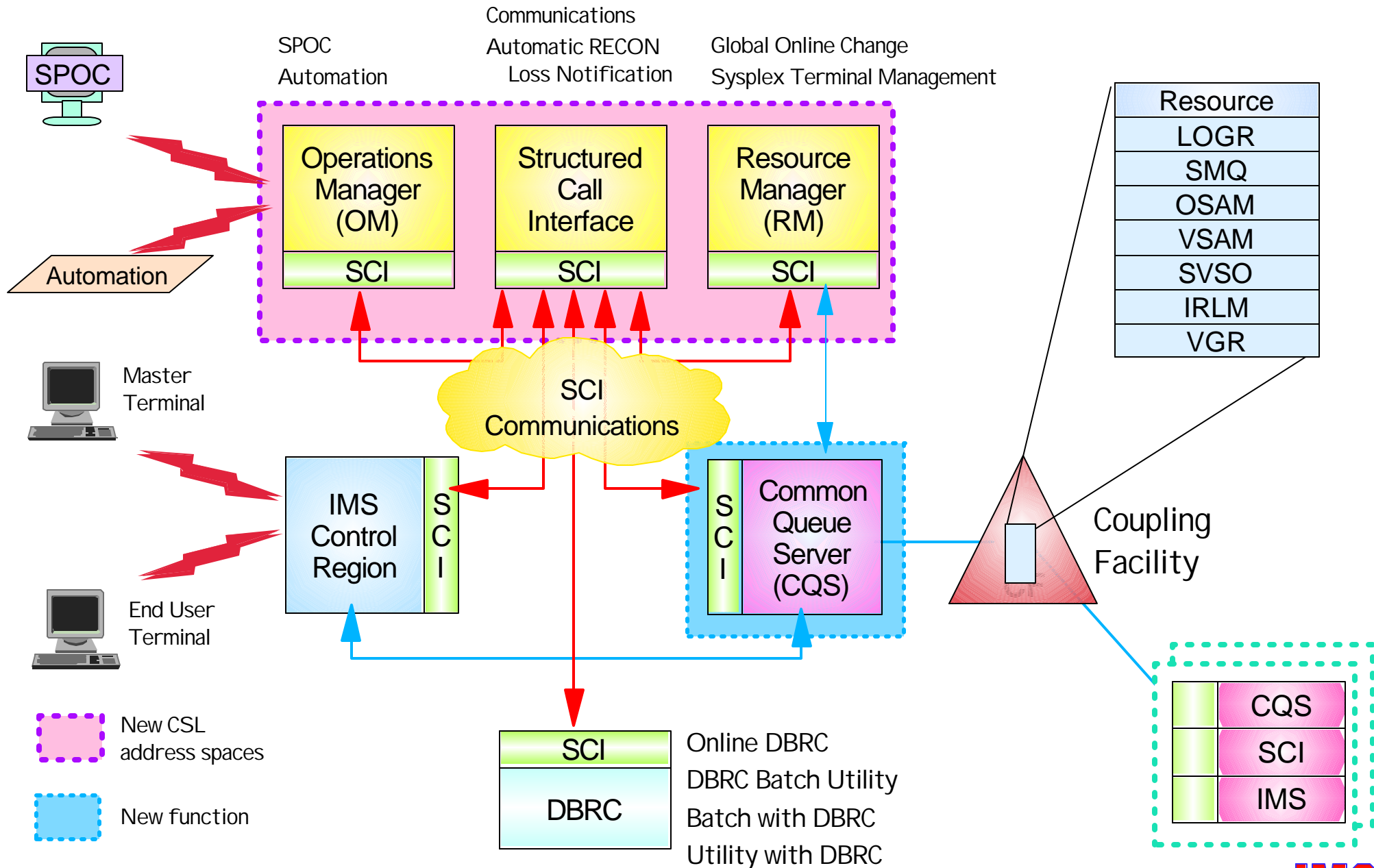
/MODIFY

/DISPLAY

IMS

Systems Management ...

IMS V8 targets systems management functions of
IMS in a parallel sysplex (IMSplex)

- ► Common Service Layer is part of an evolving IMSplex architecture
  - Required to take advantage of new systems management functions
- ► Base Primitive Environment
  - Enhanced to support new architecture
  - Basis for all new CSL address spaces
- ► New address spaces provides services to IMS clients
  - Structured Call Interface
  - Operations Manager
  - Resource Manager
- ► New function for Common Queue Server address space
  - Manage new CF Resource Structure to hold resource status information

IMS

CSL Architecture

SPOC
Automation

Communications
Automatic RECON
Loss Notification

Global Online Change
Sysplex Terminal Management

SPOC

Automation

Operations Manager (OM)
SCI

Structured Call Interface
SCI

Resource Manager (RM)
SCI

Resource
LOGR
SMQ
OSAM
VSAM
SVSO
IRLM
VGR

Master Terminal

End User Terminal

SCI Communications

IMS Control Region — S C I

S C I — **Common Queue Server (CQS)**

Coupling Facility

New CSL address spaces

New function

SCI
DBRC

Online DBRC
DBRC Batch Utility
Batch with DBRC
Utility with DBRC

CQS
SCI
IMS

IMS

Operations Management

IMS exploits CSL services to enhance

Operations Management

- ► Operations Manager services
  - OM provides new command entry API (OM API)
    - Enables programmable command entry
    - Consolidates responses from multiple command processors (IMS)

  `INIT OLC`

- ► IMS supports new IMSplex commands

  `UPD LE`

  - Entered through OM API

  `QRY STRUCTURE`

  - INITiate, TERMinate, UPDate, DELete, QueRY

- ► TSO Single Point of Control (SPOC)
  - Uses OM API to enter commands retrieve consolidated responses
    - Classic or IMSplex commands `/DIS TRAN`
  - Displays responses on TSO terminal

  `QRY TRAN`

- ► User/vendor may write own AOP using OM API

IMS

Resource Management

IMS exploits CSL services to enhance

Resource Management

- ► Resource Manager services
  - Uses CQS to maintain resource name and status information in CF list structure
- ► Sysplex Terminal Management function of IMS exploits RM with resource structure to provide ...
  - Resource name and type consistency
  - Resource name uniqueness
  - Terminal and user status recovery
  - Support for VTAM generic resource session level affinities
  - Support for global callable services
- ► Coordinated Global Online Change function of IMS exploits RM with or without resource structure to ...
  - Ensure all IMSs use same OLC data sets (requires structure)
  - Coordinate prepare and commit phases across all participating IMSs

Systems Management

The IMSplex with a Common Service Layer provides the benefits of Parallel Sysplex

- ► Capacity
- ► Performance
- ► Availability

... and enhances the system manageability of the IMSplex

- ► Resource management
- ► Operations management

IMS