B57

IMS V8 Resource Management with the Common Service Layer

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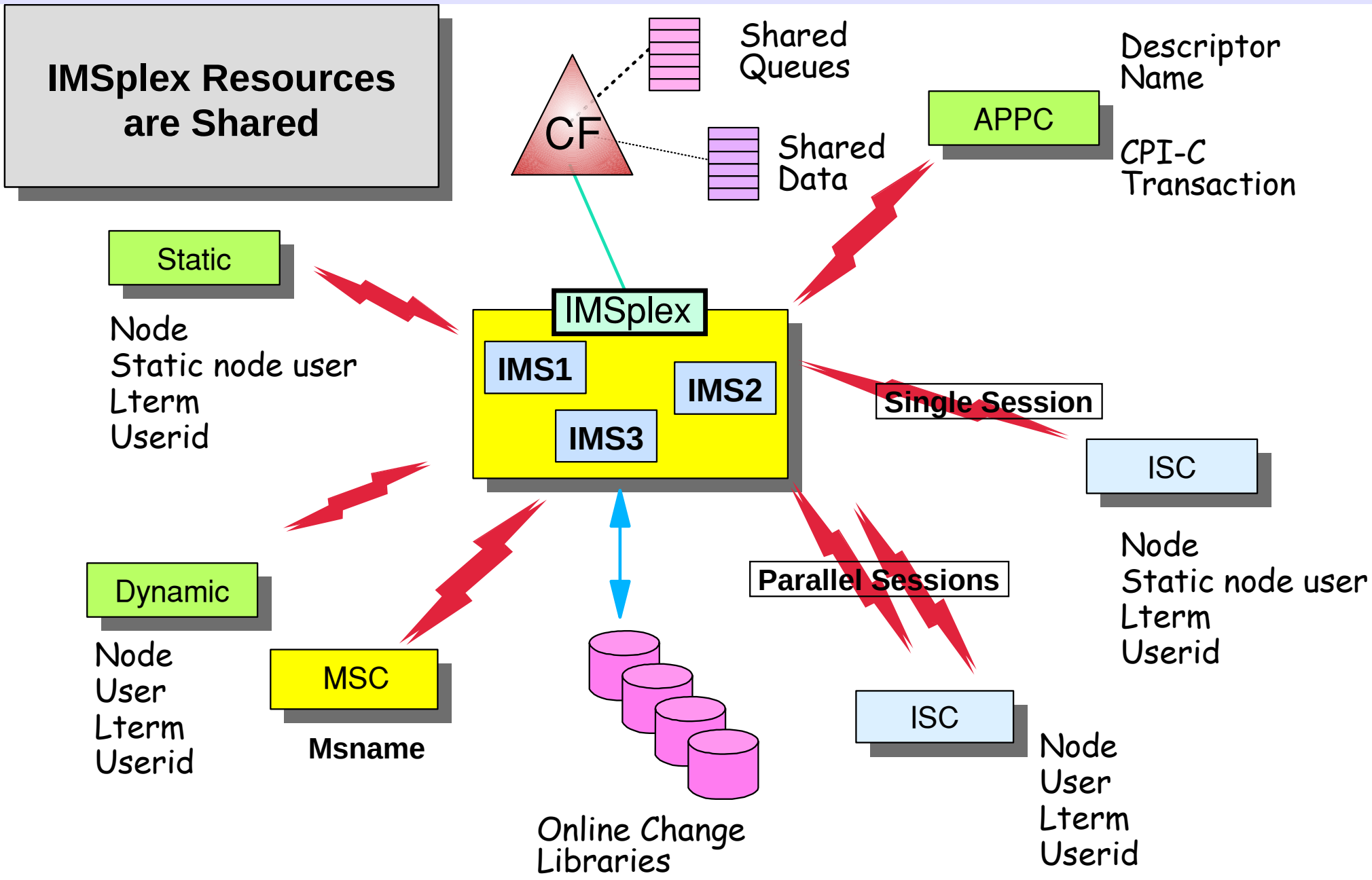
Resources



Resource Management

IMSplex systems management ***addresses resources***

- Reduces complexity of managing resources in an IMSplex

STM

Resource name and type ***consistent*** across IMSplex

- Resource type consistency enforced across IMSplex
  - For example, a resource name cannot be defined as a transaction on one IMS and as an LTERM on another

Active resource names ***unique*** within IMSplex

- Single user signon enforceable across IMSplex
- Single node logon enforced across IMSplex
- Lterm can be active on only one IMS within the IMSplex

Terminal and user state may be ***resumed*** on another IMS

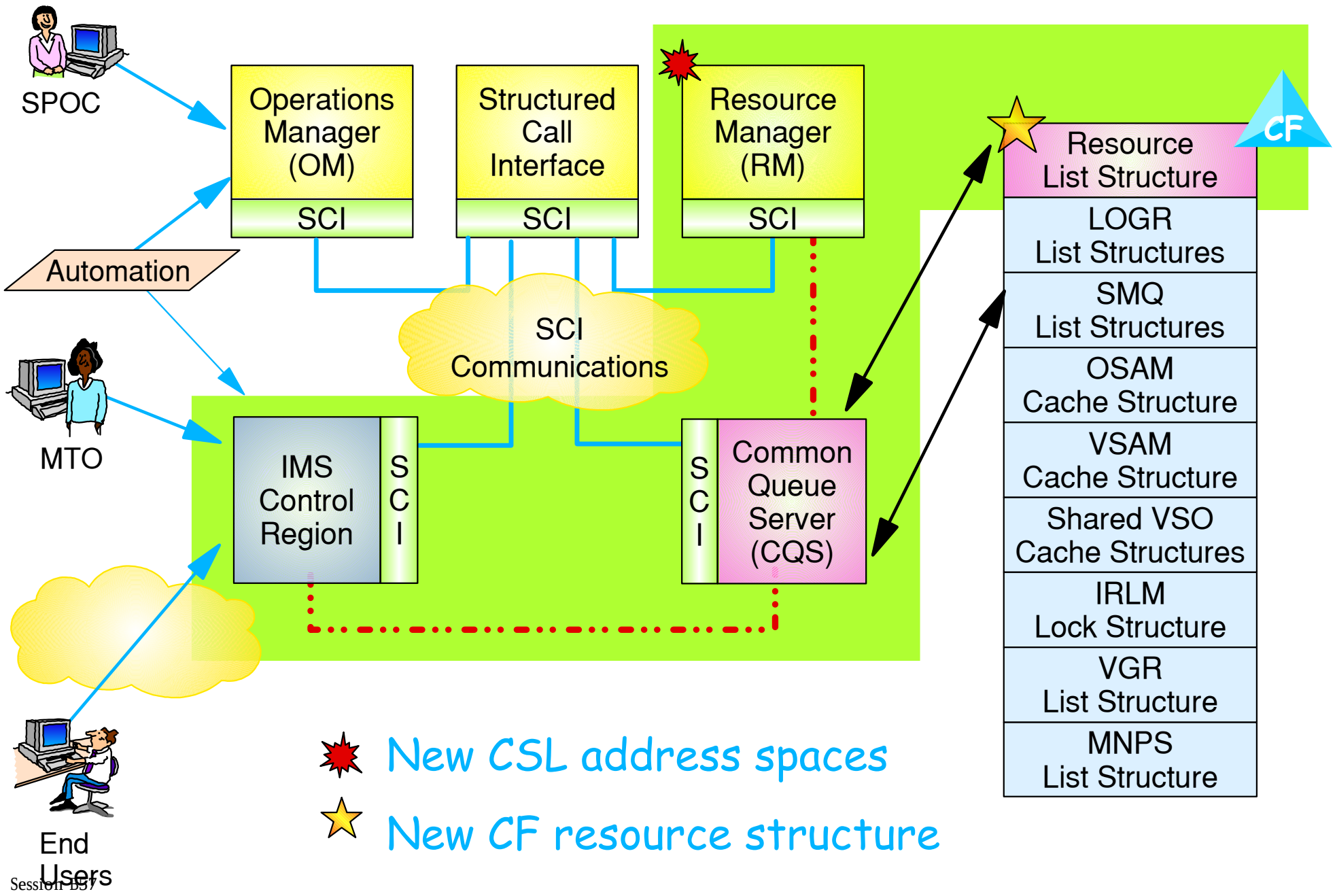
- Resume state when on another IMS within IMSplex
  - e.g., let end user resume conversation on IMS2 if IMS1 fails

G-OLC

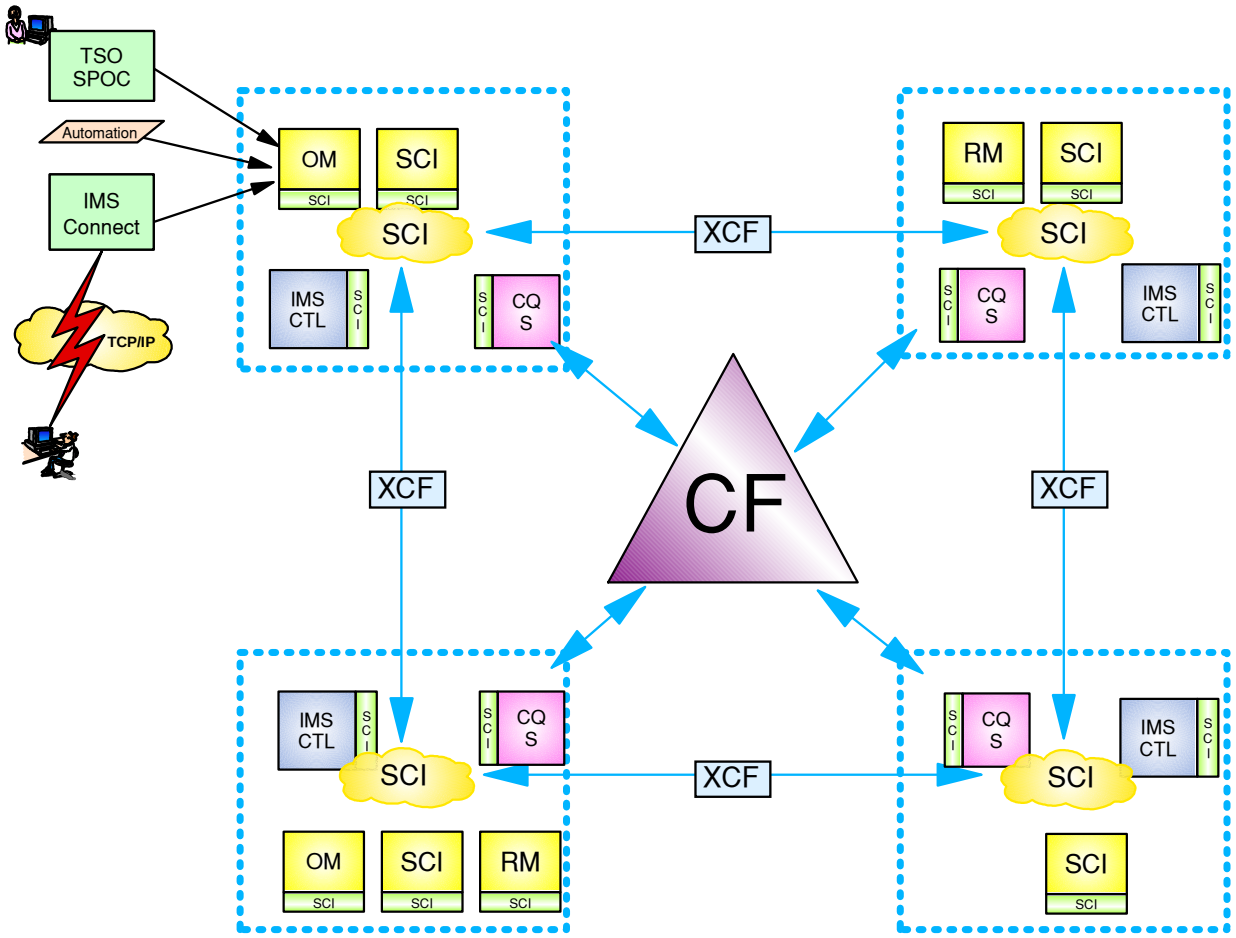
Online change can be ***coordinated*** across IMSplex

- Coordinate online change process across all IMSs in IMSplex

Resource Management Infrastructure



RM Infrastructure ...



- 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
- MNPS List Structure

IMSs in IMSplex share information in the **Resource Structure**

Resource Structure

Resource structure contains *global resource information* for uniquely named resources

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

Resource structure is optional

- 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
  - Structure will be used if available

Sysplex Terminal Management

Resource Management Infrastructure

Sysplex Terminal Management

Global Online Change

Sysplex Terminal Management (STM)

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 a resource structure

- 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

Sysplex Terminal Management (STM) ...

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 terminal and user resource status recovery across IMSplex
  - Resume significant status on another IMS after failure
  - Reduce need for IMS-managed VGR affinity
- Enable global callable services
  - User exits can access terminal and user information across IMSplex

STM Terms and Concepts

Resource

- VTAM terminal and user
  - Static/dynamic
- Transaction
  - Static/dynamic/CPI-C

Resource type consistency

- For message destinations

Resource name uniqueness

- Single active resource
- Single signon enforceable

Resource status

- Non-recoverable
- Recoverable
- Significant

Significant status

- Command
- End-user

Status recovery mode (SRM)

- Global
  - Recover anywhere
- Local
  - Recover on local only
- None
  - Not recoverable

Ownership and Affinities

- Resource ownership
- RM affinity
- VGR affinity

Resource Type Consistency

STM 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*

- *Static, dynamic, and CPI-C transaction names, Lterm names, Msnames, APPC descriptor 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

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, Users, Lterms*
- *Userids*
  - Only if single signon requested by first IMS to join IMSplex
    - SGN ¬= M

Does not apply to

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

Resource Status

Non-recoverable status

- Terminal/user status *not recovered across signoff, logoff, or restart*
- Status exists in local control blocks only while resource is active
  - Control blocks deleted/refreshed when resource becomes inactive
- Examples
  - Test mode, preset destination mode
  - *Full function response mode*

Recoverable status

- Terminal/user status may be *recovered across signoff, logoff, or restart*
- Status saved in resource structure and/or local control blocks
- Recovered if resource not deleted
  - Deleted if no *significant status*
- Examples
  - Stopped, exclusive, MFS test, ...
  - Conversational, Fast Path, STSN

Significant Status

Significant status

- Recoverable terminal or user status that *prevents deletion of resource* at signoff, logoff, or IMS restart
- Command significant status
  - Terminal or user status normally set via command
  - Always maintained globally if RM structure is used
- End-user significant status
  - Work-related terminal or user status
  - Maintained locally, globally, or not at all depending on *Status Recovery Mode*

Non-significant status

- Any other terminal or user status
- May or may not be recovered
  - Does not prevent deletion but may be recovered if other significant status prevents deletion

Significant Status ...

Command significant status

- VTAM terminal or user *status normally set by command*
  - /TEST MFS (node, user)
  - /STOP (node, user, lterm)
  - /EXCLUSIVE (node, user)
  - /TRACE (node)
  - /CHANGE USER AUTOLOGON SAVE (user)
  - /ASSIGN LTERM|USER xxx TO yyy SAVE (lterm)

- Command significant status *always kept globally if ...*
  - RM structure used

- Command significant status *also kept locally if ...*
  - Resource is active on local system, or
  - Resource is inactive but end-user status is kept locally, or
  - Trace status exists locally for a node

Significant Status ...

End-user significant status (nodes and users)

- Work-related status
  - Conversation
    - Active and held
  - Fast path
    - FP response mode

Applies to static nodes, parallel session ISC subpools, and ETO users.

- STSN sequence numbers
  - Last input and output

Applies to static and dynamic nodes

- May be kept *globally or locally*
  - Depends on Status Recovery Mode (SRM)

If a resource has significant status at session termination or ETO user signoff

- Resource will not be deleted
  - Unless SRM=NONE or RCVYxxxx=NO (no status recovery)
- If resource not deleted
  - Recoverable status will be recovered at next logon, signon, or restart

Status Recovery Mode

Status recovery mode (SRM) applies to end-user status

- Defines scope of *end-user* status recovery for terminal/user resource

- GLOBAL
  - Recoverable status *kept in RM structure*
    - Available from any IMS in IMSplex
    - System default if using RM, RM structure, and SQ
  - Status restored at next logon/signon to any IMS
    - Status copied to local control blocks when resource becomes active

- LOCAL
  - Recoverable status *kept in local control blocks and log records*
    - System default if not using RM, RM structure, and SQ
  - Status restored at next logon/signon if logging on to same IMS

- NONE
  - Recoverable status *kept locally* while resource active
  - Deleted at signoff, logoff, or IMS restart

Status Recovery Mode ...

System default can be overridden for each individual IMS

- Parameter in DFSDCxxx

  SRMDEF=GLOBAL | LOCAL | NONE

  - Global requires RM, RM structure, and shared queues
  - Local (or none) requires neither

System default can be overridden for each terminal / user

- For *all static and all STSN terminals*
  - SRM set at terminal *logon* based on SRM default
    - Can be overridden by DFSLGNX0 if no end-user status at logon
- For *dynamic non-STSN terminals*
  - SRM set at user *signon* based on SRM default
    - Can be overridden by user descriptor or DFSSGNX0 if no end-user status at signon

End-user Status Recoverability

When SRM is Global or Local

- *Recoverability* can be set for each type of end-user status
- Parameter in DFSDCxxx
  - Conversation
    - Applies to conversational status only - messages are still recoverable

      RCVYCONV=YES | NO
  - STSN
    - Applies to STSN sequence numbers only - messages are still recoverable

      RCVYSTSN=YES | NO
  - Fast Path
    - Applies to both Fast Path status and messages

      RCVYFP=YES | NO

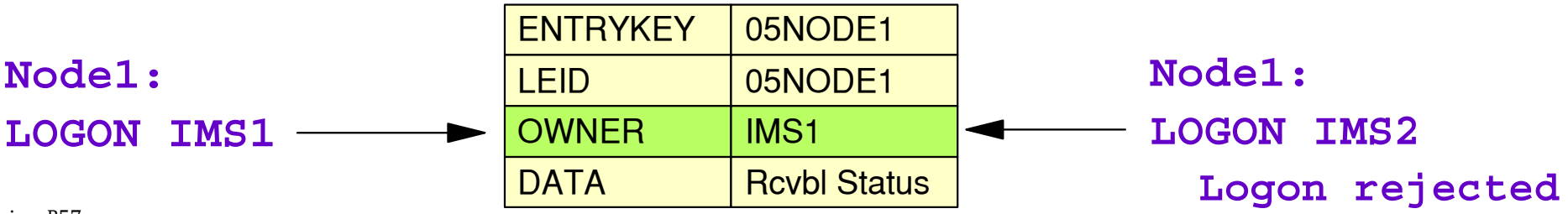
Ownership and RM Affinity

Applies to nodes, users, and userids when using RM structure

- When resource becomes active in any IMS
  - Resource entry created on RM structure
    - Userid created only if SGN ¬= M
  - Resource is *owned* by that IMS
    - Resource entry in structure contains imsid (owner)
    - ISC parallel session nodes do not set ownership
    - ISC parallel session users (subpools) do set ownership
  - Prevents owned resource from logging/signing on to IMS2 while still owned by IMS1

RM Affinity

- Another term for ownership (nodes and users)
  - Means user "should" return to same IMS to resume status



VTAM Generic Resources

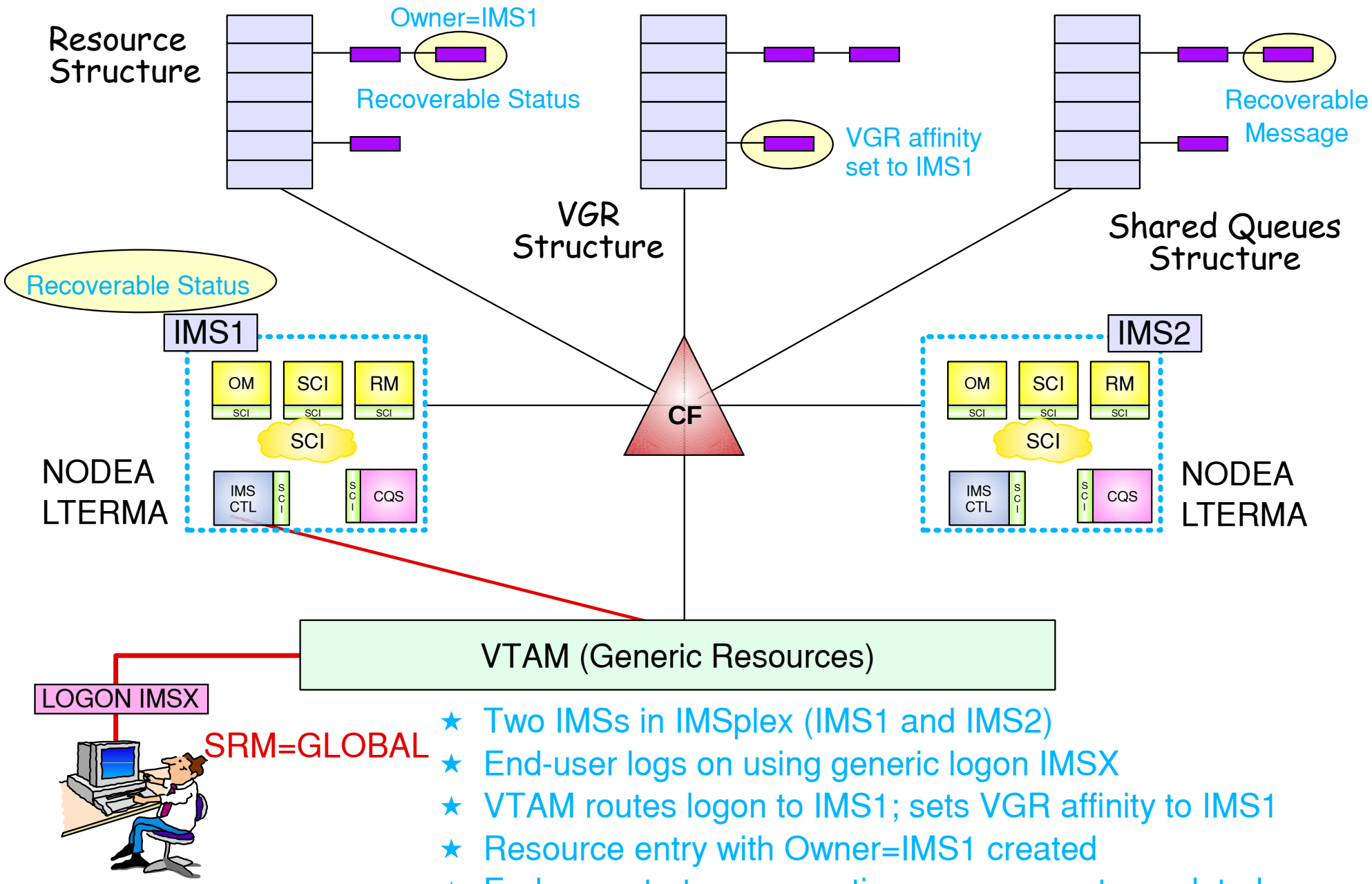
IMS V8 (z/OS V1R2 and later)

- VTAM supports *session-level affinity*
  - IMS sets the affinity level (IMS or VTAM) during session initiation for every session, including ISC
    - VTAM now supports ISC affinity management
  - GRAFFIN= keyword is ignored !

- VTAM-managed is set for ...
  - Static terminals with SRM=GLOBAL|NONE
  - Static and dynamic STSN terminals (ISC, SLUP, FINANCE) with SRM=GLOBAL|NONE
  - Dynamic non-STSN terminals with any SRM

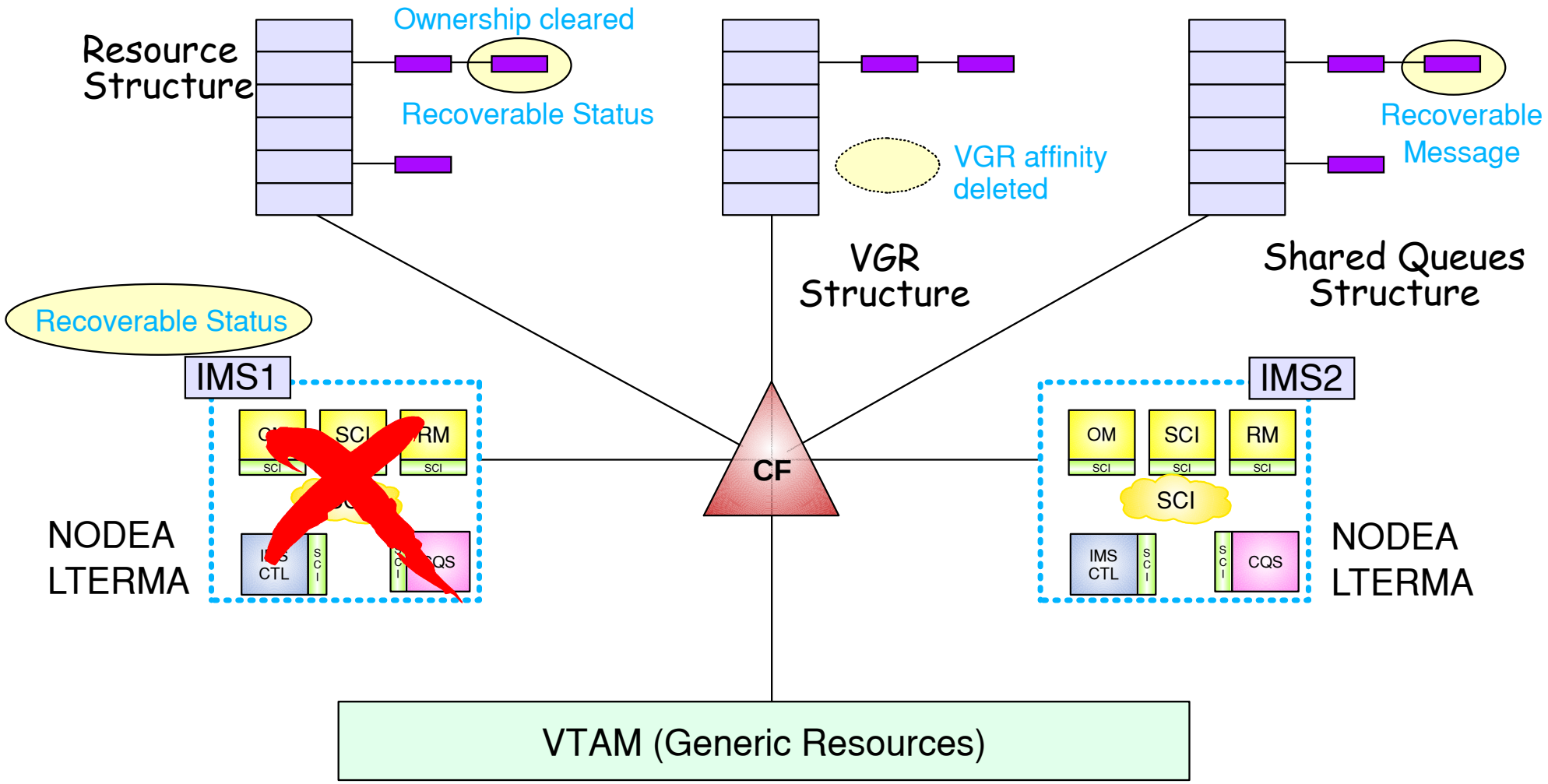
- IMS-managed is set for ...
  - Static terminals with SRM=LOCAL
  - STSN terminals with SRM=LOCAL

Status Recovery - SRM=GLOBAL



- ★ Two IMSs in IMSplex (IMS1 and IMS2)
- ★ End-user logs on using generic logon IMSX
- ★ VTAM routes logon to IMS1; sets VGR affinity to IMS1
- ★ Resource entry with Owner=IMS1 created
- ★ End-user starts conversation; resource entry updated

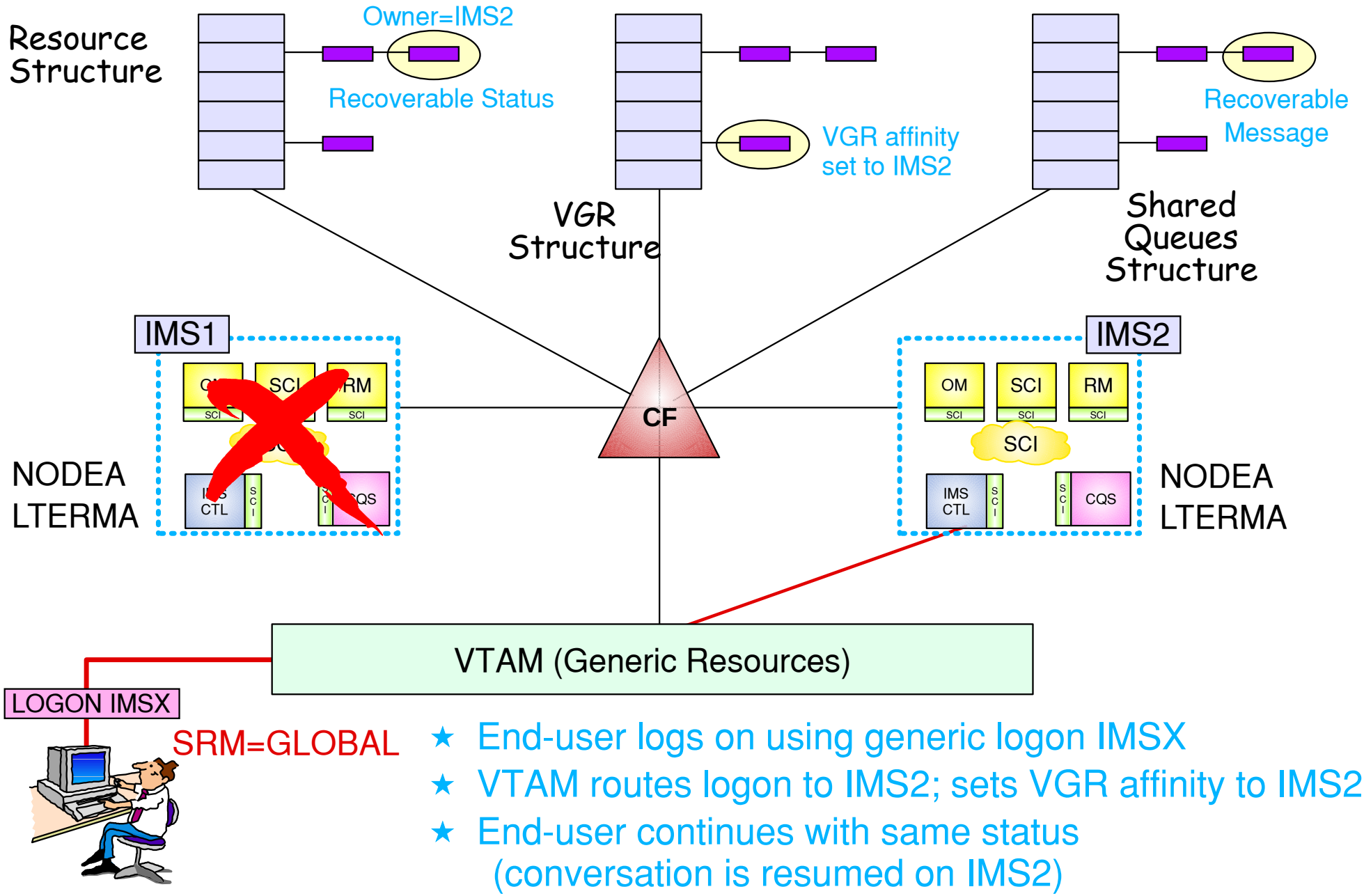
Status Recovery - SRM=GLOBAL ...



SRM=GLOBAL

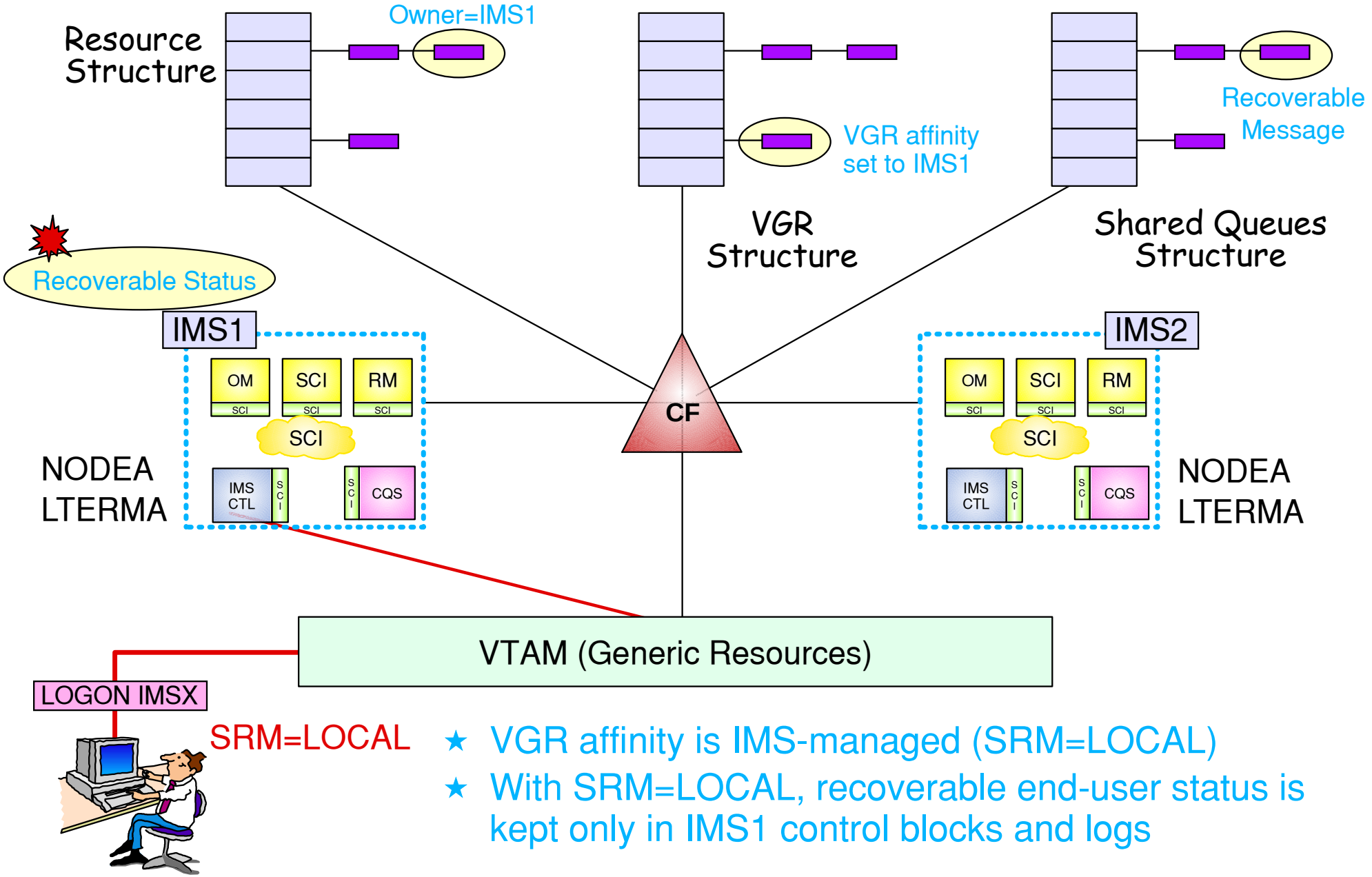
- ★ IMS1 fails; IMS2 queries structure for IMS1 entries
- ★ IMS2 does not delete resource entry (user in conversation)
- ★ IMS2 clears ownership (SRM=GLOBAL)
- ★ VTAM deletes VGR affinity

Status Recovery - SRM=GLOBAL ...



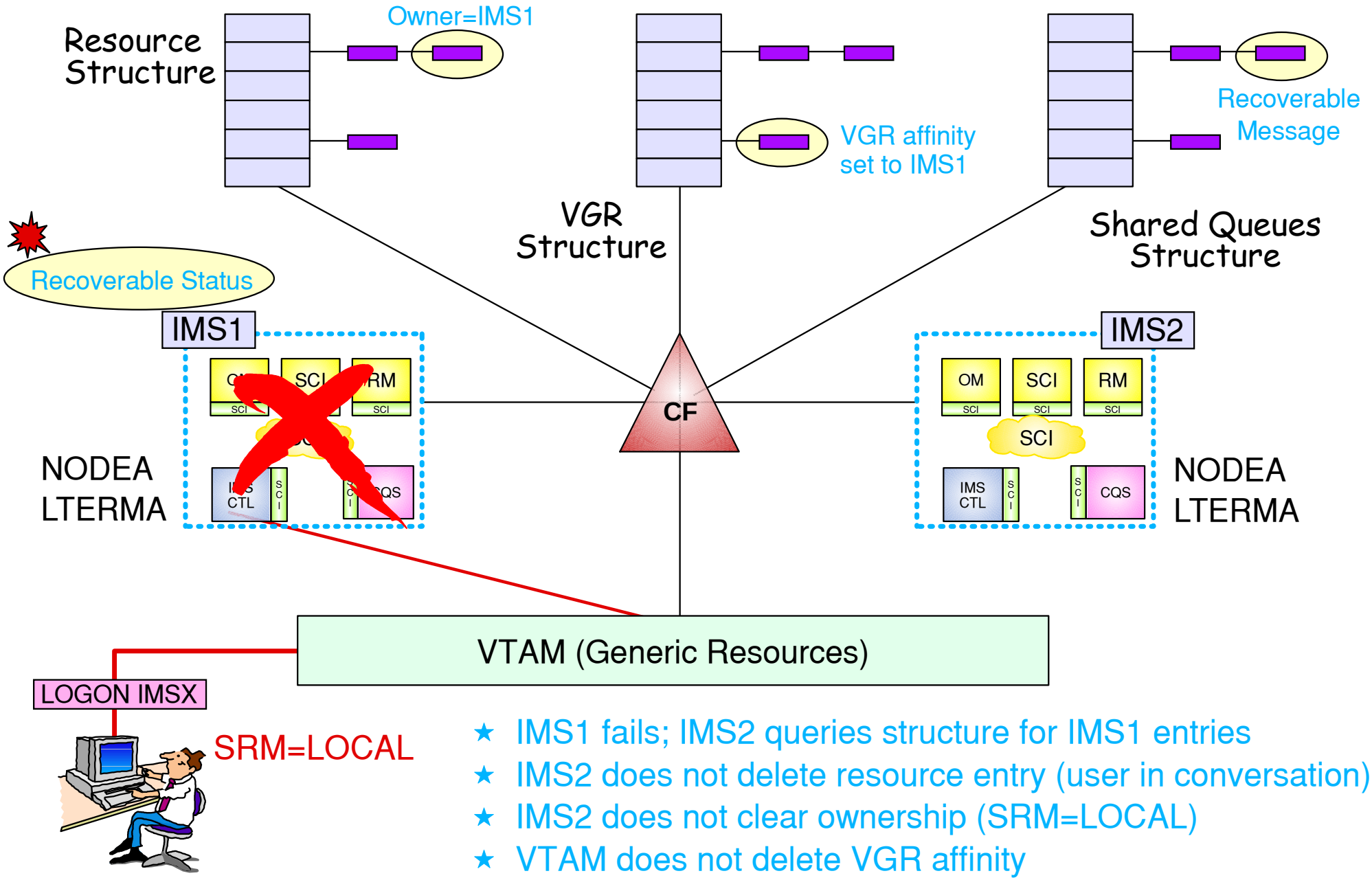
- ★ End-user logs on using generic logon IMSX
- ★ VTAM routes logon to IMS2; sets VGR affinity to IMS2
- ★ End-user continues with same status (conversation is resumed on IMS2)

Status Recovery - SRM=LOCAL



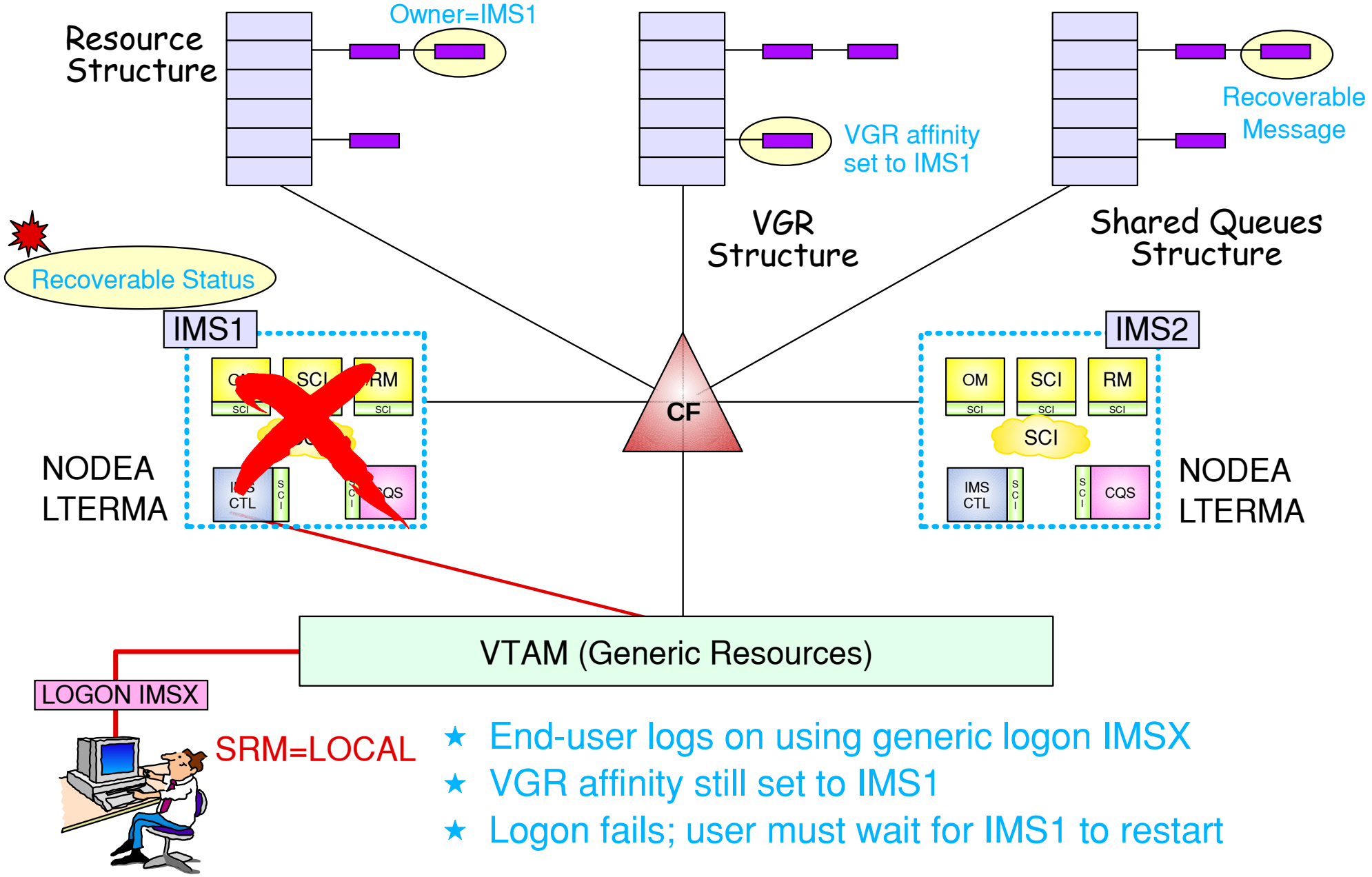
- ★ VGR affinity is IMS-managed (SRM=LOCAL)
- ★ With SRM=LOCAL, recoverable end-user status is kept only in IMS1 control blocks and logs

Status Recovery - SRM=LOCAL ...



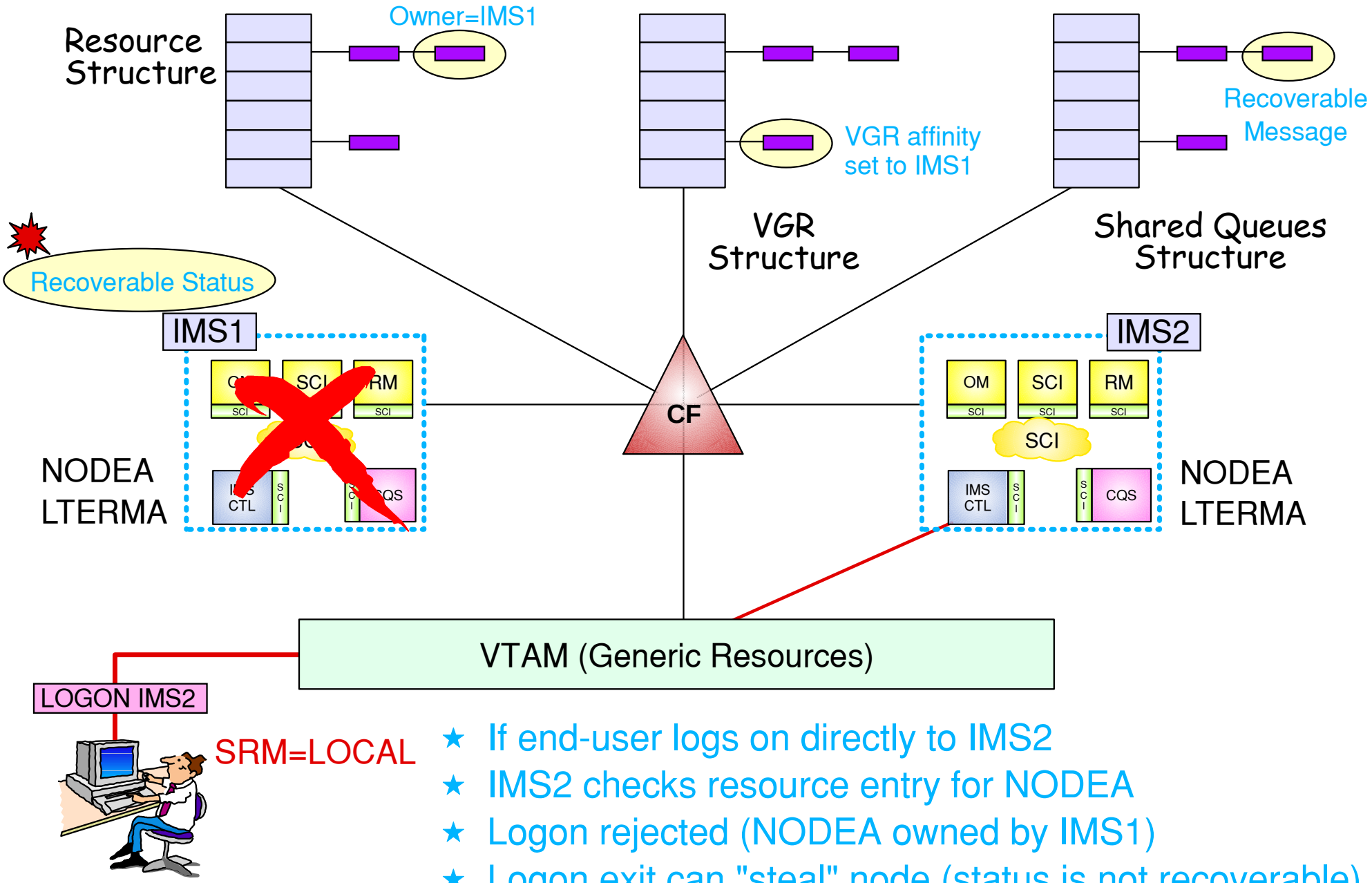
- ★ IMS1 fails; IMS2 queries structure for IMS1 entries
- ★ IMS2 does not delete resource entry (user in conversation)
- ★ IMS2 does not clear ownership (SRM=LOCAL)
- ★ VTAM does not delete VGR affinity

Status Recovery - SRM=LOCAL ...



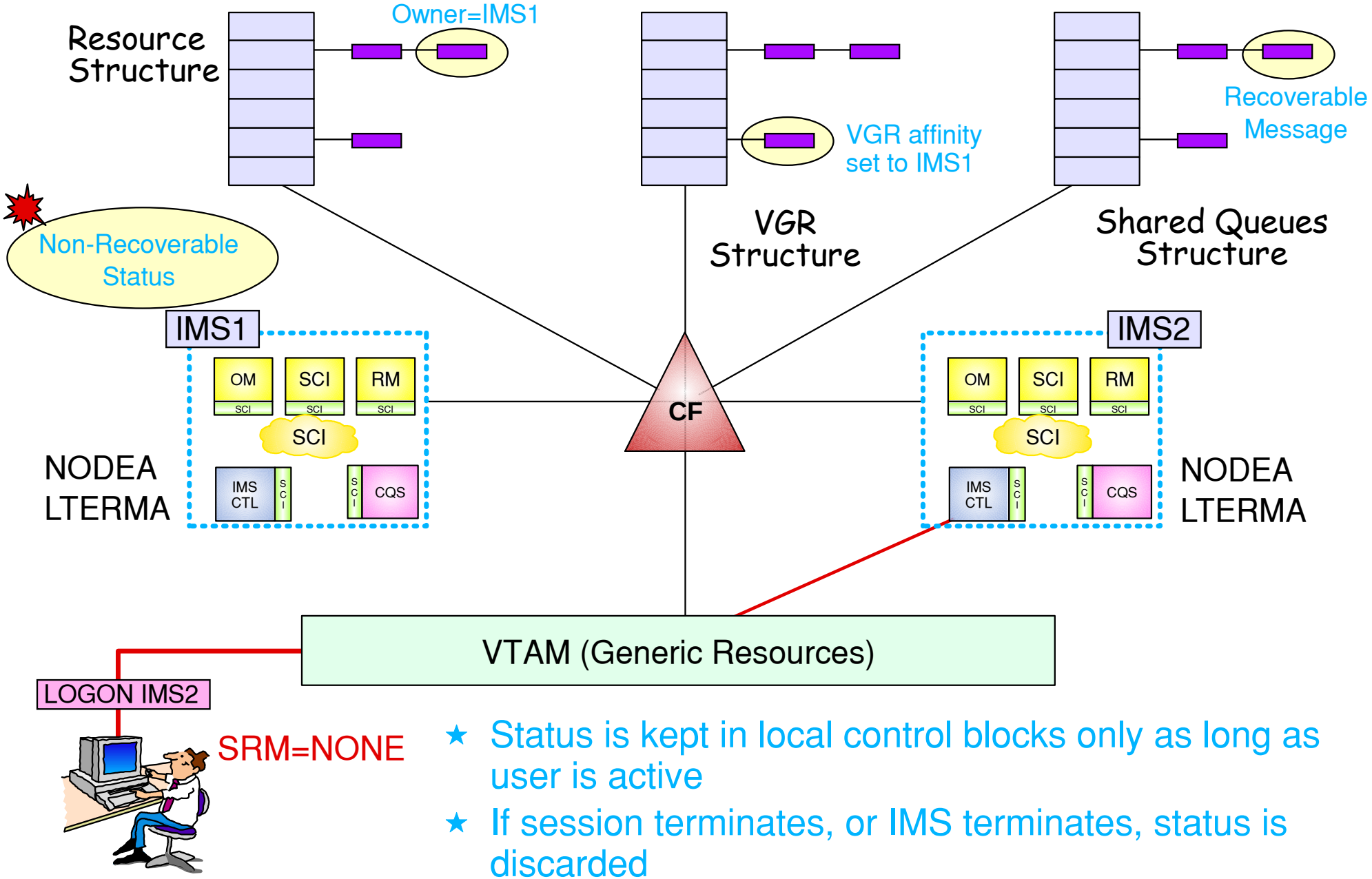
- ★ End-user logs on using generic logon IMSX
- ★ VGR affinity still set to IMS1
- ★ Logon fails; user must wait for IMS1 to restart

Status Recovery - 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)

Status Recovery - SRM=NONE



- ★ Status is kept in local control blocks only as long as user is active
- ★ If session terminates, or IMS terminates, status is discarded

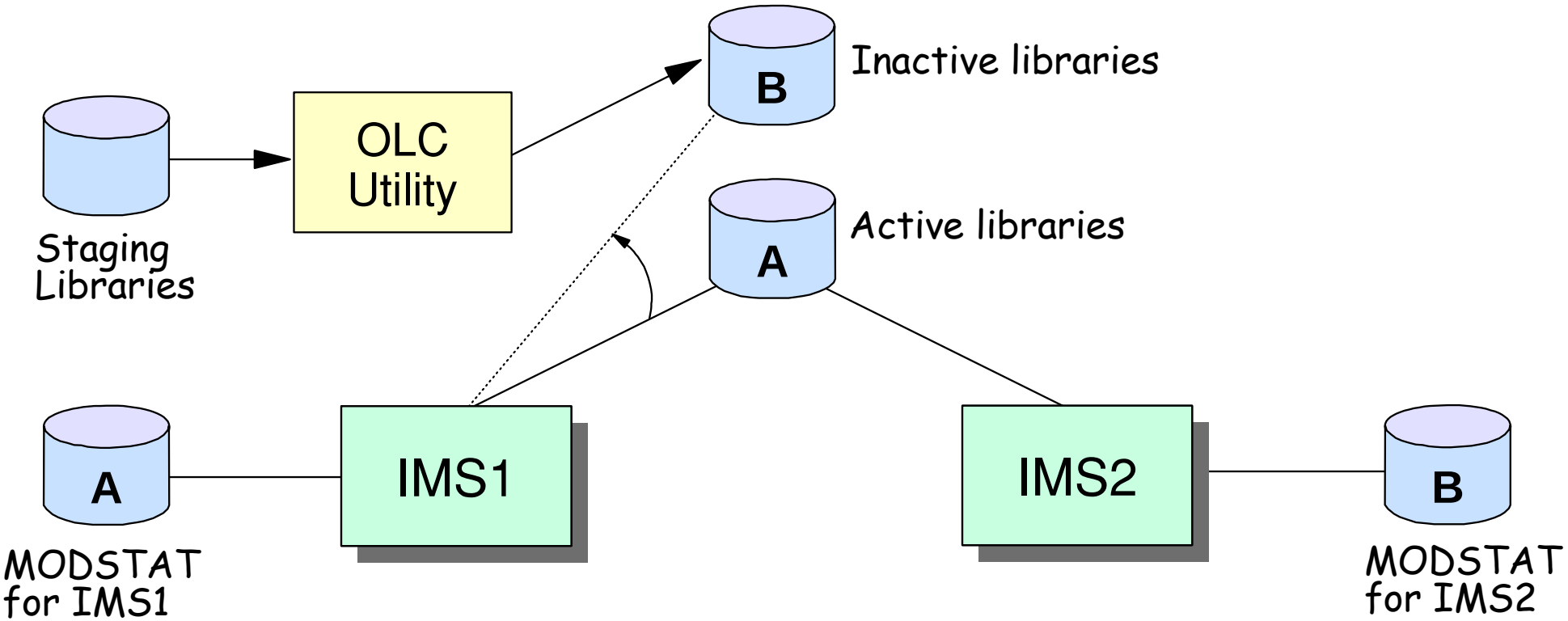
Global Online Change

Resource Management Infrastructure

Sysplex Terminal Management

Global Online Change

Local Online Change



/MODIFY PREPARE
/DIS MODIFY - OK
/MODIFY COMMIT

Successful
Switch libraries
Resume processing

/MODIFY PREPARE
/DIS MODIFY - OK
/MODIFY COMMIT

Unsuccessful
What to do?

1. Correct problem with IMS2 and redo OLC
2. Back out OLC for IMS1

Global Online Change

Global online change (G-OLC)

- IMS V8 enhancement
  - *Optional* alternative for local online change
- Coordinates online change across multiple IMSs in an IMSplex
- Requires Operations Manager
  - Used to enter *global online change commands*
- Requires Resource Manager
  - Used to *coordinate online change process*

G-OLC Overview

All IMSs use same OLCSTAT data set

- Identifies suffix of active libraries

INITIATE OLC PHASE(PREPARE) TYPE(ALL|ACBLIB|...)

- Command entered through OM (e.g., from SPOC)
- All IMSs execute OLC prepare phase
  - Stop queuing affected messages
- Response returned to SPOC

QUERY MEMBER TYPE(IMS) SHOW(STATUS)

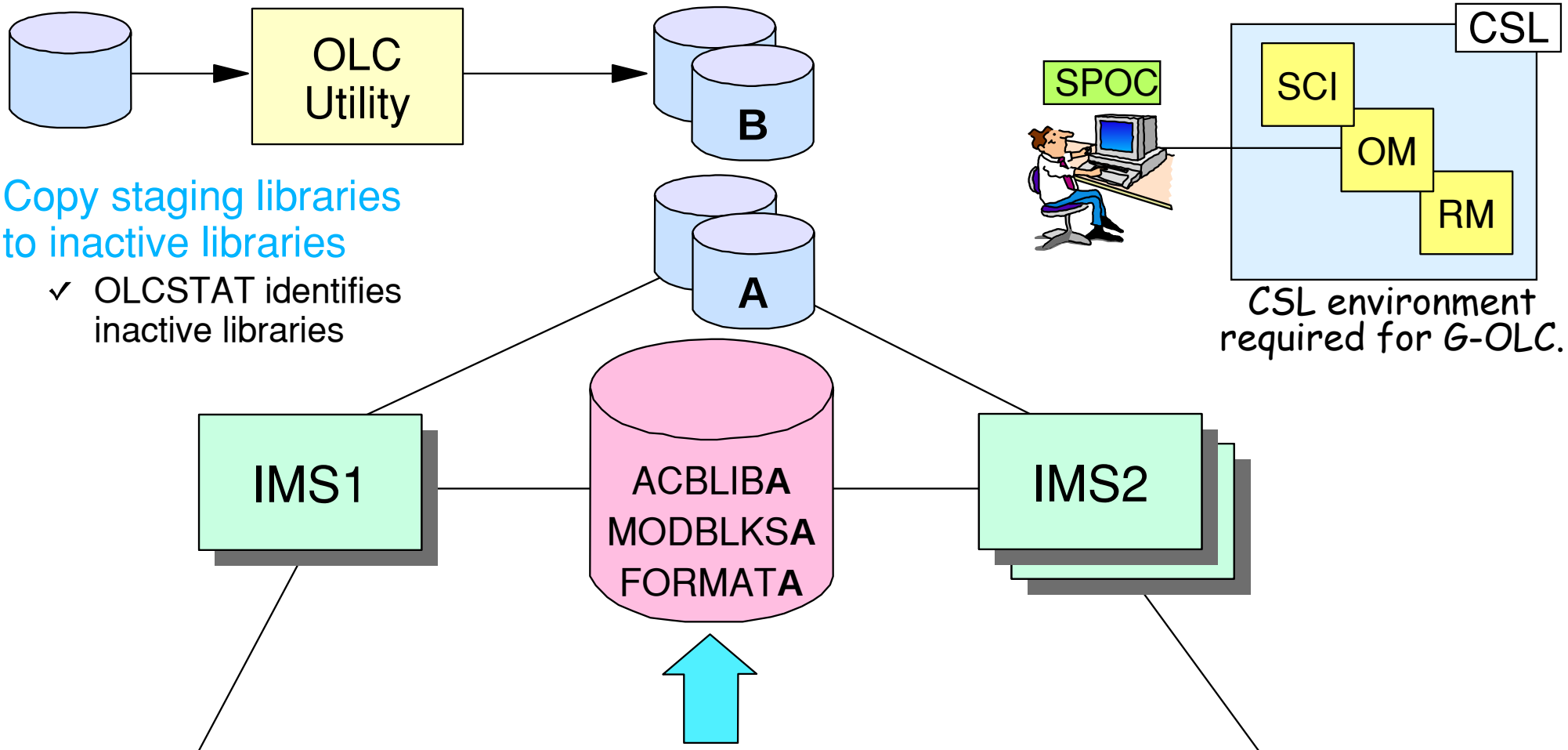
- Displays current OLC status of each IMS

INITIATE OLC PHASE(COMMIT)

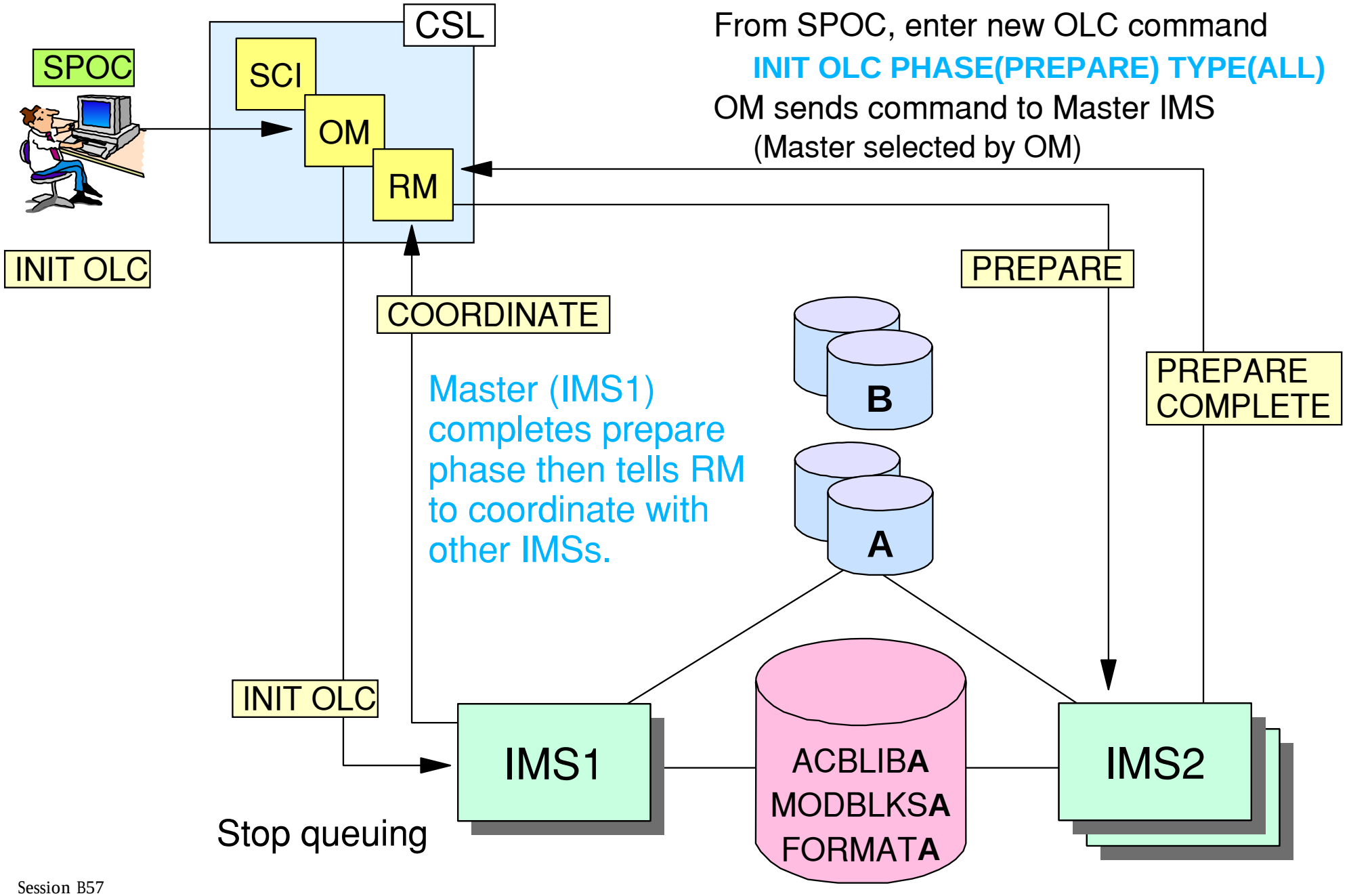
- All IMSs execute *commit phase 1*
  - Stop scheduling
- All IMSs execute *commit phase 2*
  - Switch libraries
  - Resume processing
- All IMSs execute *commit phase 3*
  - Clean up

Resource Manager coordinates all Prepare and Commit processing.

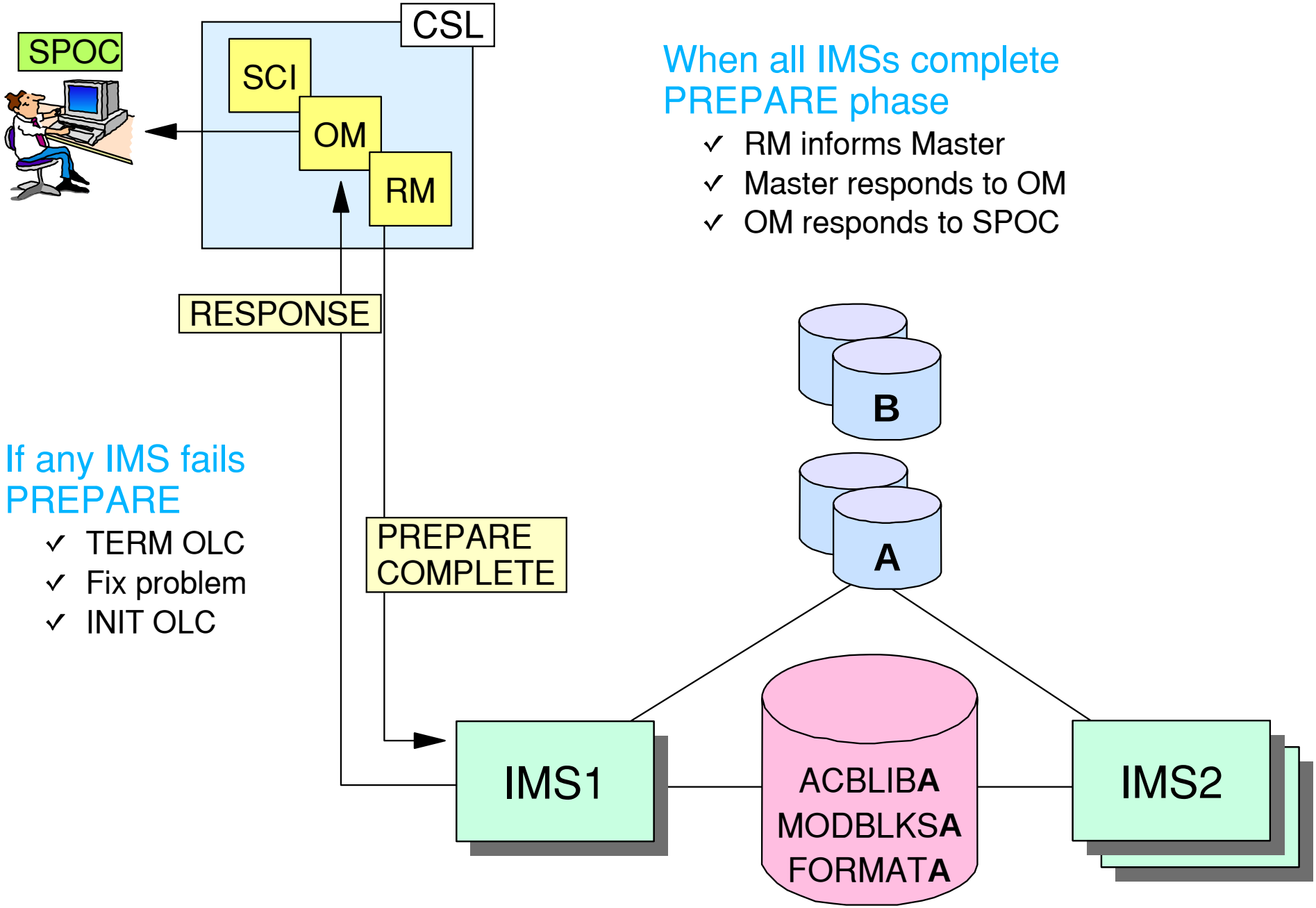
G-OLC: Before OLC Begins



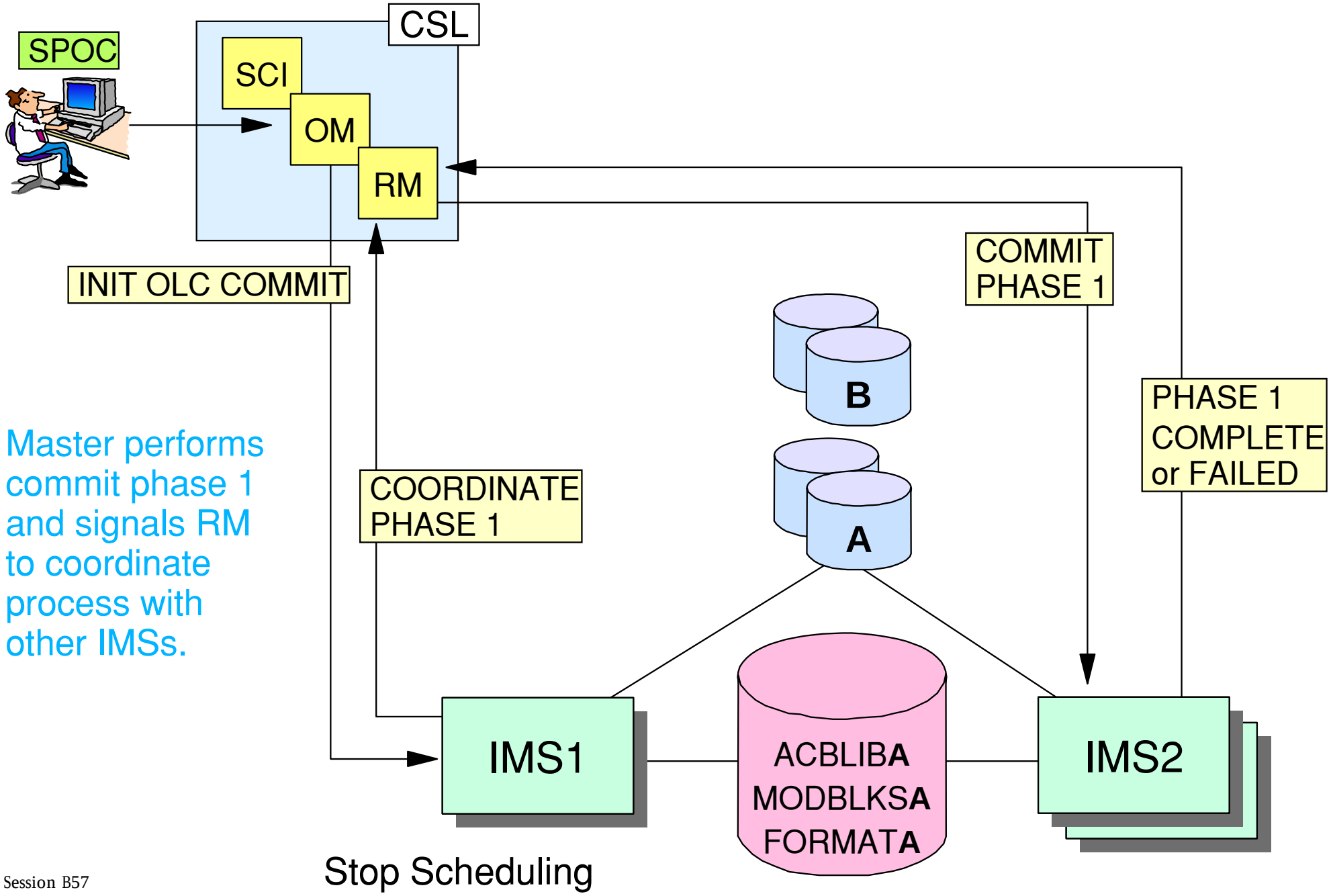
G-OLC: Prepare Phase



G-OLC: Prepare Phase Complete



G-OLC: Commit Phase 1



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

G-OLC: Commit Phase 1 Complete

SPOC

CSL

SCI

OM

RM

INIT OLC COMMIT

PHASE 1 COMPLETE

B

A

IMS1

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

IMS2

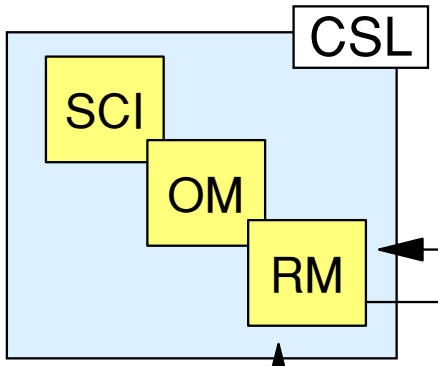
If any IMS fails phase 1

- ✓ OLC commit 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

G-OLC: Commit Phase 2

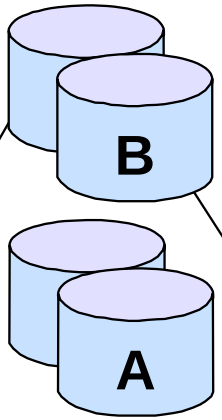


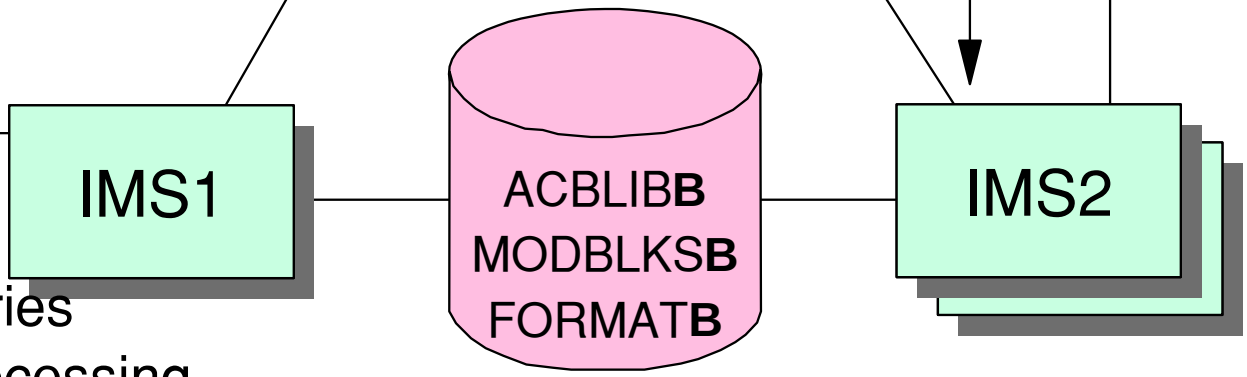
Master performs commit phase 2 and signals RM to coordinate process with other IMSs.

COMMIT PHASE 2

PHASE 2 COMPLETE

COORDINATE PHASE 2

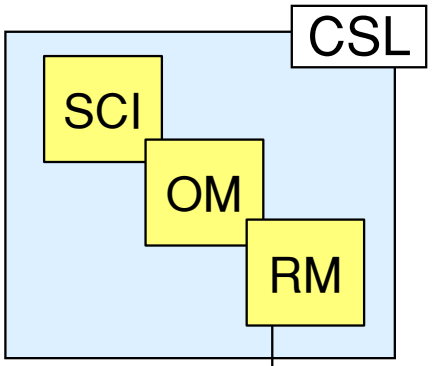




Switch libraries

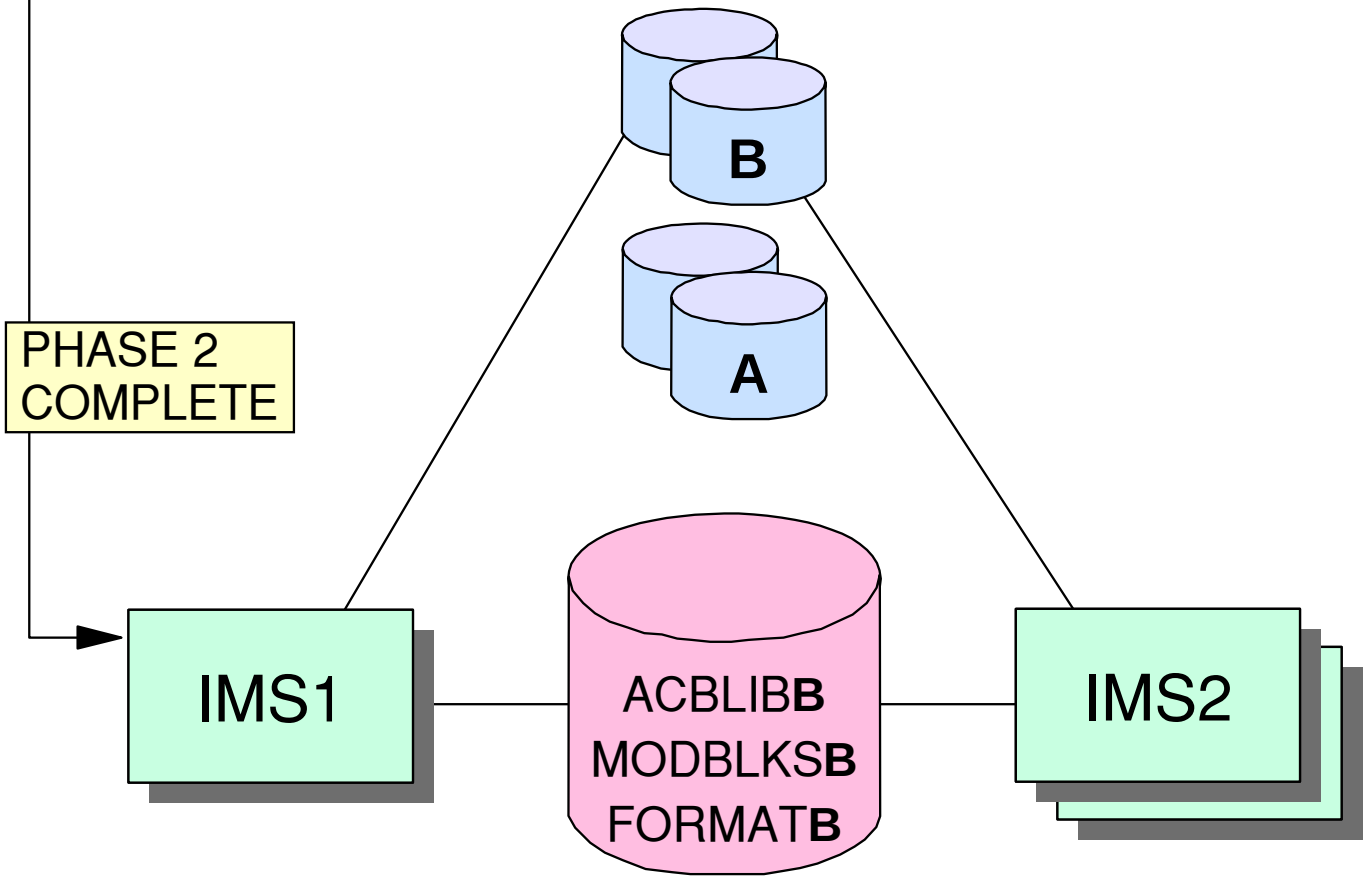
Resume processing

G-OLC: Commit Phase 2 Complete



When RM signals Master that phase 2 is complete

- ✓ Phase 3 initiated to cleanup local storage and OLCSTAT.



Summary

Resource Manager is part of Common Service Layer

- Joins IMSplex
  - Registers with SCI
  - Uses SCI to communicate with other IMSplex members
- One RM address space required per IMSplex
  - If resource structure defined
    - May have multiple RMs for availability and performance
  - Built on Base Primitive Environment (BPE)
- Provides resource management services to IMS
  - Sysplex terminal management
    - Consistency checking
    - Uniqueness
    - Status recovery
  - Global online change
    - IMS coordinate library switches

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