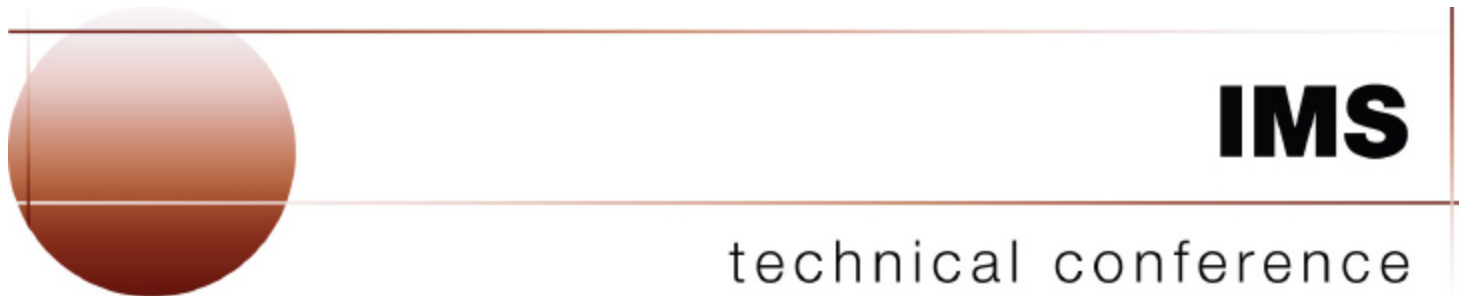


E70

IMS V8 Operations Managementp

Ken Blackman
kblackm@us.ibm.com



Las Vegas, NV

September 15 - September 18, 2003

© IBM Corporation 2003

IMS V8 Operations Managment

Sysplex Operations - Today

- ▶ **Command Routing**

Operations Manager(OM)

- ▶ **What is it**
- ▶ **Command support**
- ▶ **Migration Considerations**



Sysplex Operations pre-IMS V8

Command Routing

- ▶ Commands may be entered by each MTO
 - Most commands and automation processes today can only affect an individual IMS
 - Some commands have a GLOBAL parameter, but ...
 - Asynchronous responses (e.g., DFS0488I message) from other IMSs are not returned to MTO entering command

- Example:

```
/DBR DATABASE XYZ GLOBAL
```

```
DFS058I DBR COMMAND IN PROGRESS
```

```
DFS0488I DBR COMMAND COMPLETED DBN XYZ RC=nn
```

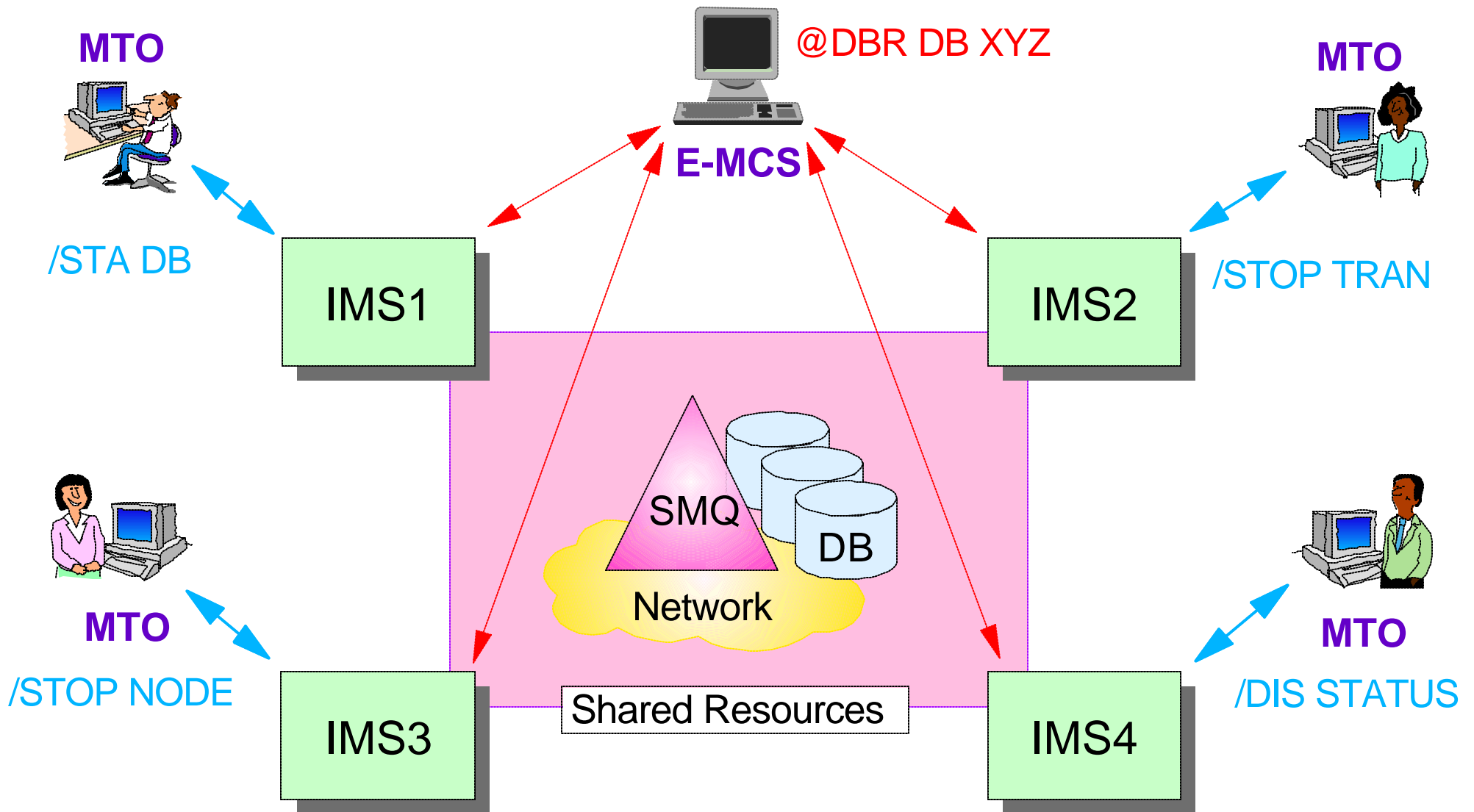
- ▶ Commands may be submitted to all IMSs from E-MCS console

```
@DBR DATABASE XYZ
```

- Requires all IMSs to have same Command Recognition Character
- Both synchronous and asynchronous responses sent to E-MCS console



IMS Resource Sharing



They *do not share* a common command entry point.
E-MCS not part of the IMSplex environment.
Command Routing is awkward (at best).



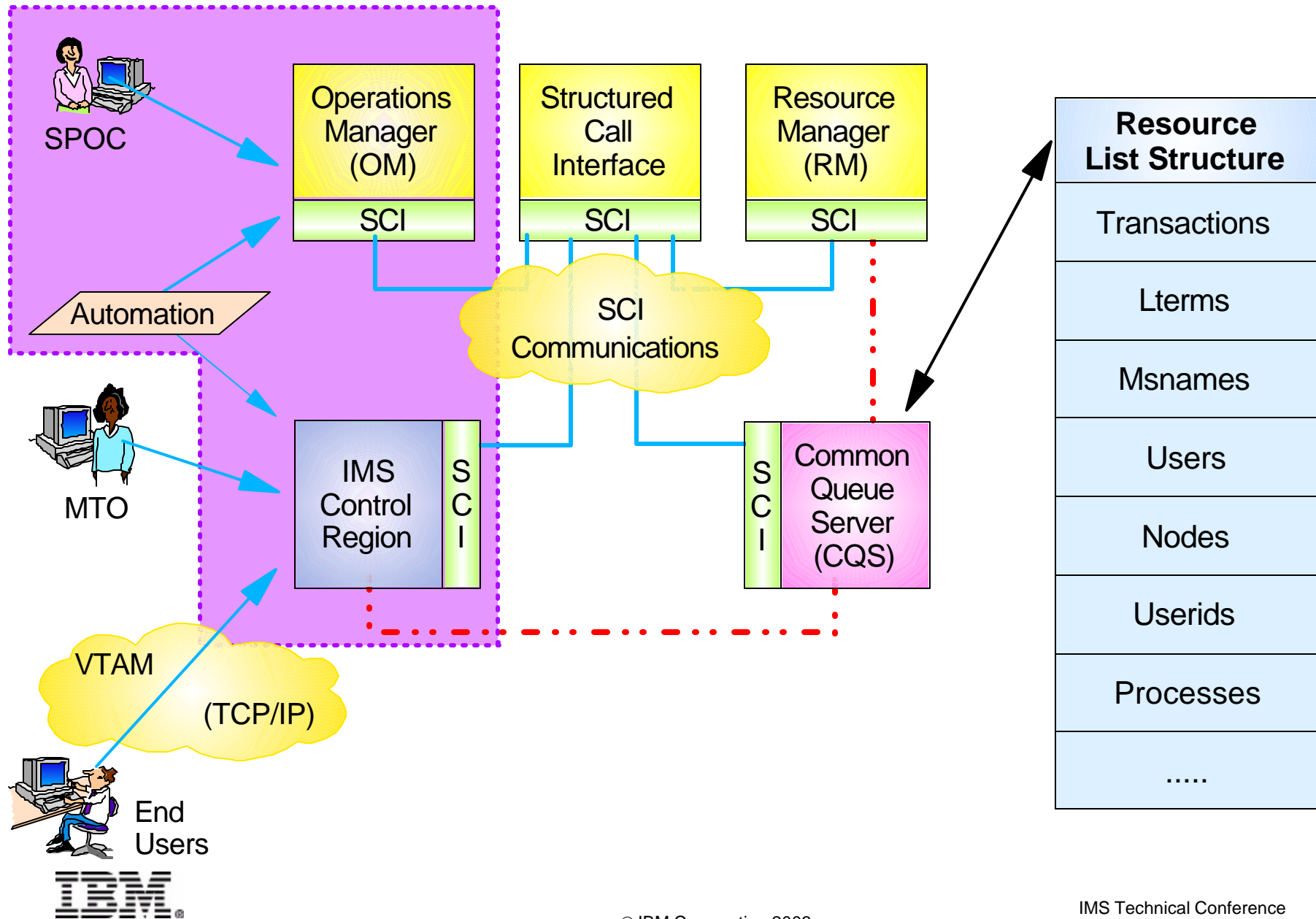
Operations Management

Operations Manager

- ▶ Provides an API allowing common point of command entry into IMSplex
 - Focal point for operations management and automation
- ▶ Provides the following services to members and clients of an IMSplex
 - Provide an API for IMS commands for automation
 - Classic IMS commands (/cmd ...)
 - New IMSplex commands
 - Command registration to support any command processing client
 - Clients tell OM which commands it can process
 - 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
 - Can specify time-out value for response
 - Command security
 - Perform authorization within OM - before sending to IMS
 - RACF (or equivalent)
 - User-written command security exit



OM Is Part of the CSL



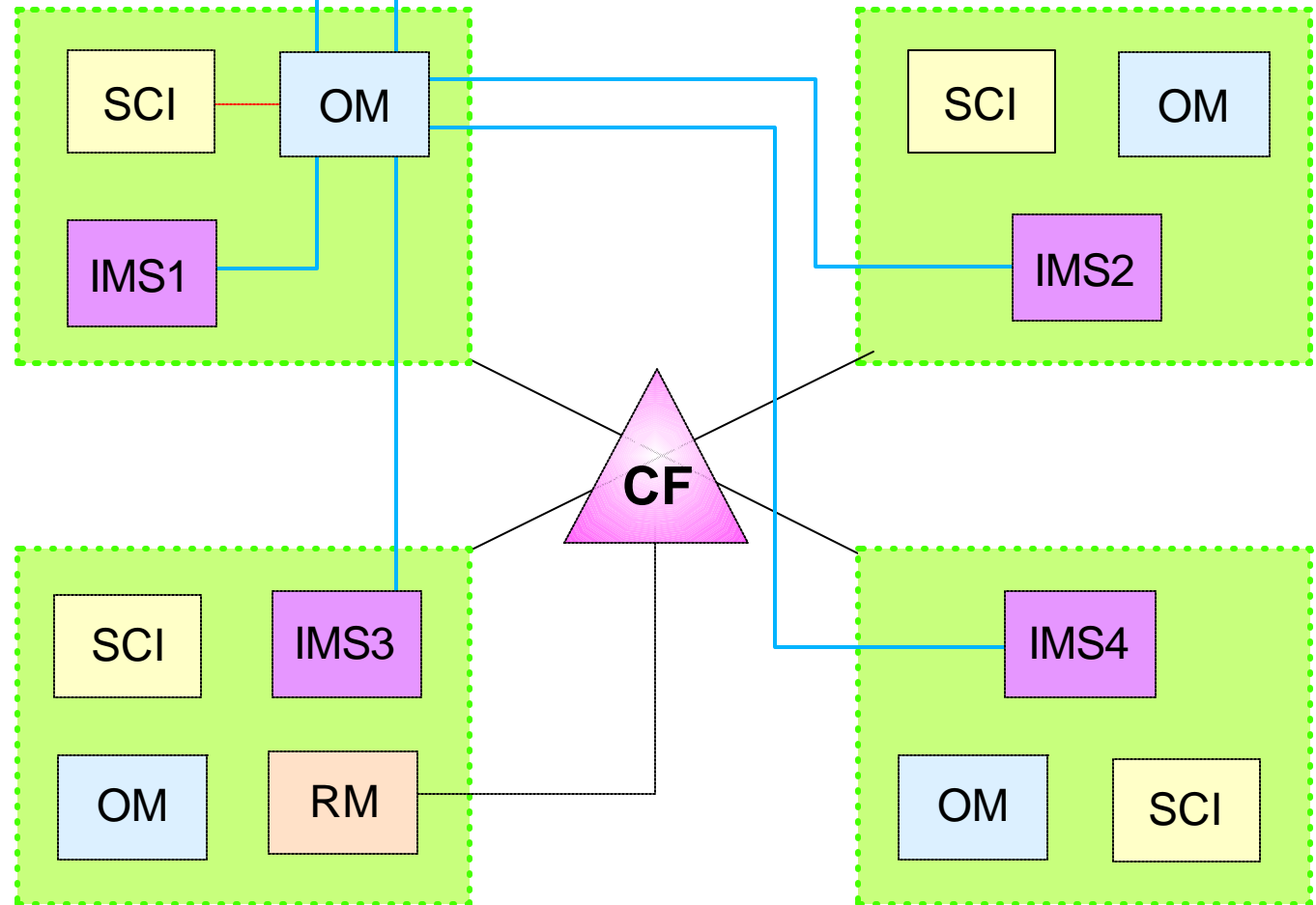
OM in an IMSplex



SCI

SCI

Automation



SPOC or AOP can specify routing for any command

OM routes command to one or more IMSs

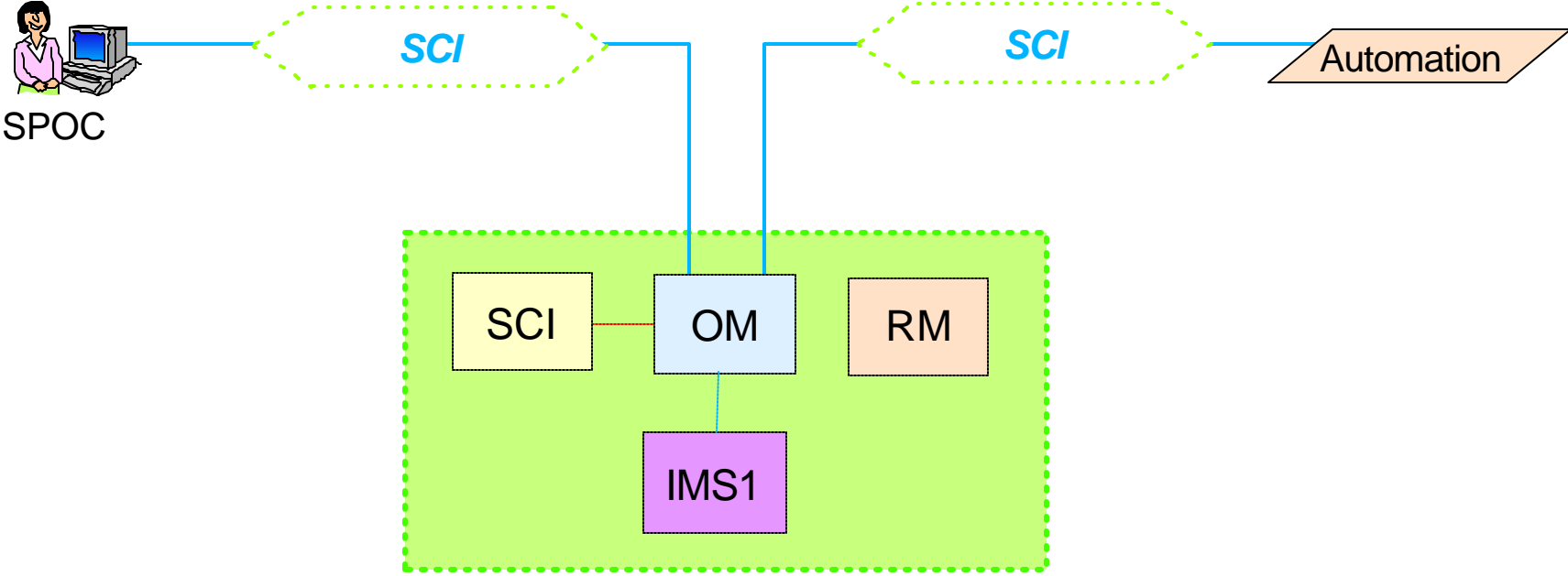
Each IMS responds to OM

OM consolidates responses for SPOC

Additional OM address spaces are optional.



OM in an IMSplex



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

 - Two types of AO APIs supported
 - Command entry AO clients
 - Command forwarding AO clients

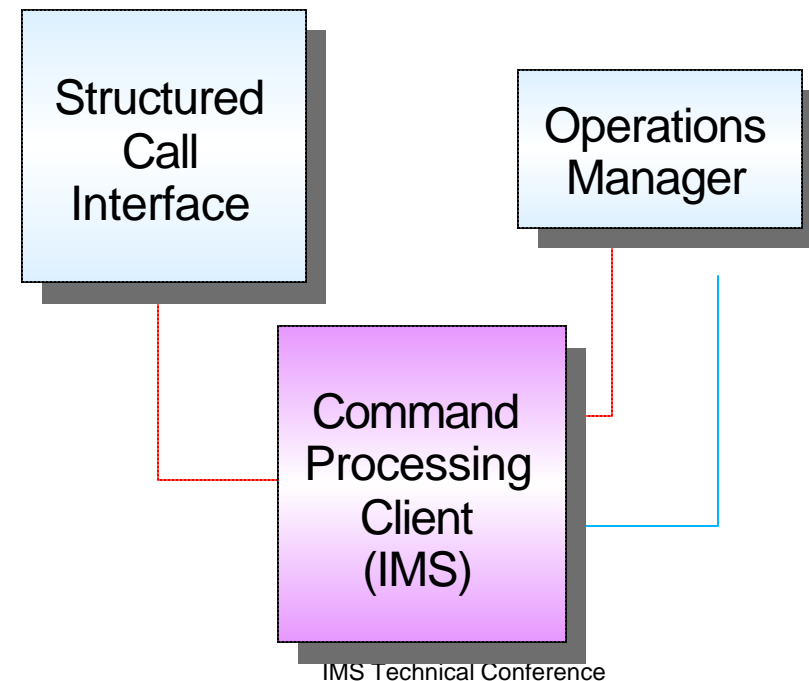
- ▶ All OM services are invoked by CSLOMxxx macros
 - Macro coding and use is described in [CSL Guide and Reference](#)



Command Processing Client

Command processing client

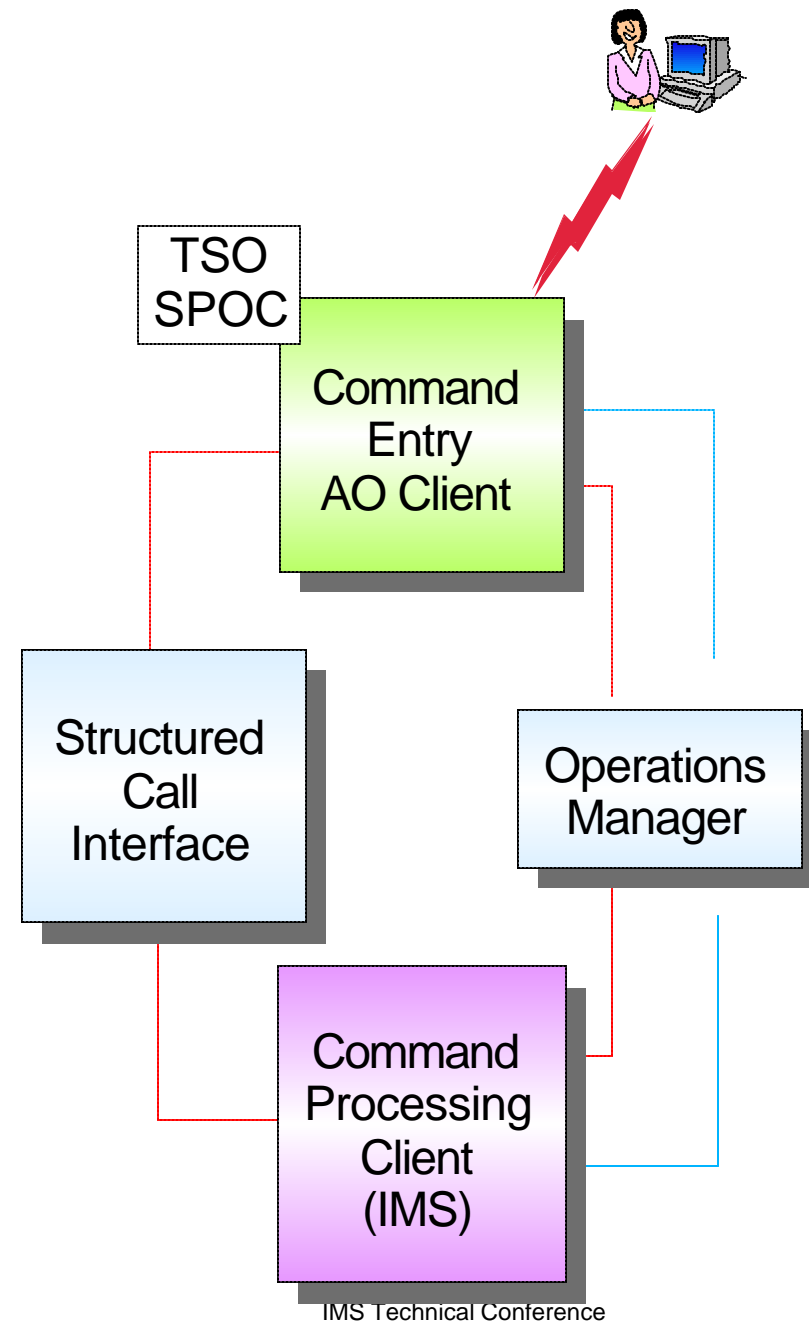
- ▶ OM client that processes commands
 - IMS is a command processing client of OM
- ▶ CP client
 - Registers with SCI
 - Must be on same OS image
 - Registers with OM
 - Identifies commands that it can process
 - Any OS image in IMSplex
 - Processes commands received from OM
 - Sends command response back to OM
 - Deregisters from OM
 - Deregisters from SCI



AO Client

Command entry client

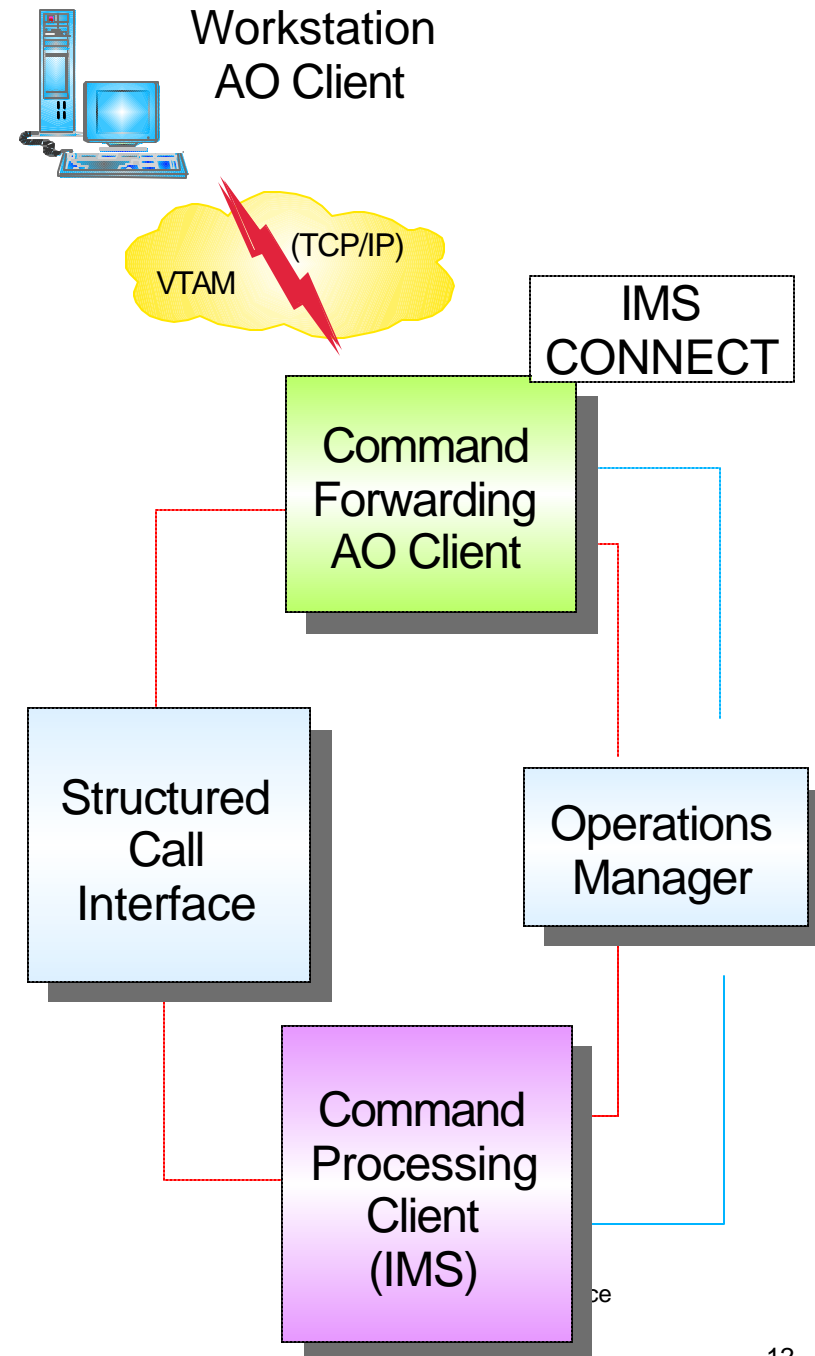
- ▶ OS/390 address space that enters commands directly to OM
 - Command is entered by "operator" in the CE address space
 - TSO SPOC is a CE client
- ▶ CE client
 - Registers with SCI
 - Accepts commands from operator
 - Uses **CSLOMCMD** macro interface to send commands to OM and receive reply in XML format
 - Formats reply for display
 - Deregisters from SCI



AO Client ...

Command forwarding client

- ▶ OS/390 address space that forwards commands from workstation to OM
 - Command is entered by "operator" from a non-390 workstation
- ▶ CF client
 - Registers with SCI
 - Accepts commands from workstation
 - Uses **CSLOMI** macro interface to send command input to OM and receive reply in XML format
 - Passes XML output to workstation
 - Workstation formats reply for display
- Deregisters from SCI



OM - Command Support

Commands

- ★ **New IMSplex commands**
- ★ **Classic IMS commands**



New IMSplex Commands

INIT (INITiate process)

- ▶ **INIT OLC** - starts a coordinated online change (OLC)

TERM (TERMinate process)

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

DEL (DELeTe resource)

- ▶ **DEL LE** - deletes runtime LE options

UPD (UPDate resource)

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



New IMSplex Commands ...

QRY (QueRY resource)

- ▶ **QRY IMSPLEX** - returns the names of the members in the IMSplex
- ▶ **QRY LE** - returns runtime LE options
- ▶ **QRY MEMBER** - returns status and attributes of the IMS members in the IMSplex
- ▶ **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



New IMSplex Commands ...

Some IMSplex command characteristics

- ▶ Can only be entered through [OM interface](#)
 - Cannot be entered directly to IMS
- ▶ Command Response returned to SPOC/AOP in [XML format](#)
 - Must be translated by SPOC/AOP to display format
- ▶ [Filters and Wildcards](#) supported for resource name selection
 - The percent sign (%) wildcard is used for single character substitution
 - The asterisk (*) wildcard is used for multi character substitution



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

Response formatting
is responsibility of
command originator

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

Trancode	MbrName	CC	Cls	Status
PART	IMS1	0	4	STOQ,STOSCHD,TRA
PART	IMS2	0	4	STOQ,STOSCHD,TRA
PART	IMS3	0	4	STOQ,STOSCHD,TRA



Classic IMS Commands

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

- ▶ IMS commands specific to an input LTERM are not supported by OM

- For example

`/SIGN ON|OFF`

`/EXIT, /REL`

`/RCL`

IMS asynchronous command response

- ▶ When command response includes a synchronous DFS058I message followed by one or more asynchronous messages (e.g., DFS0488I)
 - The synchronous DFS058I message is not returned
- ▶ Only the messages indicating the command completed are returned
- ▶ Applies only to commands routed through OM API
 - Does not apply to existing interfaces



Classic IMS Commands ...

If Resource Structure exists, some commands have global impact

```
/STOP NODE ABC
```

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

Some commands execute in every IMS where command sent

- ▶ Not aware of IMSplex

```
/DIS QCNT TRAN TRX1
```

- 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, affect significant status, resource exists on structure, resource owned by this IMS, resource owned by another IMS, display or update, ...



Operations Management in IMS V8...

► Types of SPOCs

► TSO SPOC

- IMS system management application comprised of ISPF panel interface on a TSO terminal

► Control Center for IMS

- IMS system management application with a graphical user interface

► REXX Program using the REXX SPOC API

- An application programming interface that allows automation programs to perform SPOC functions

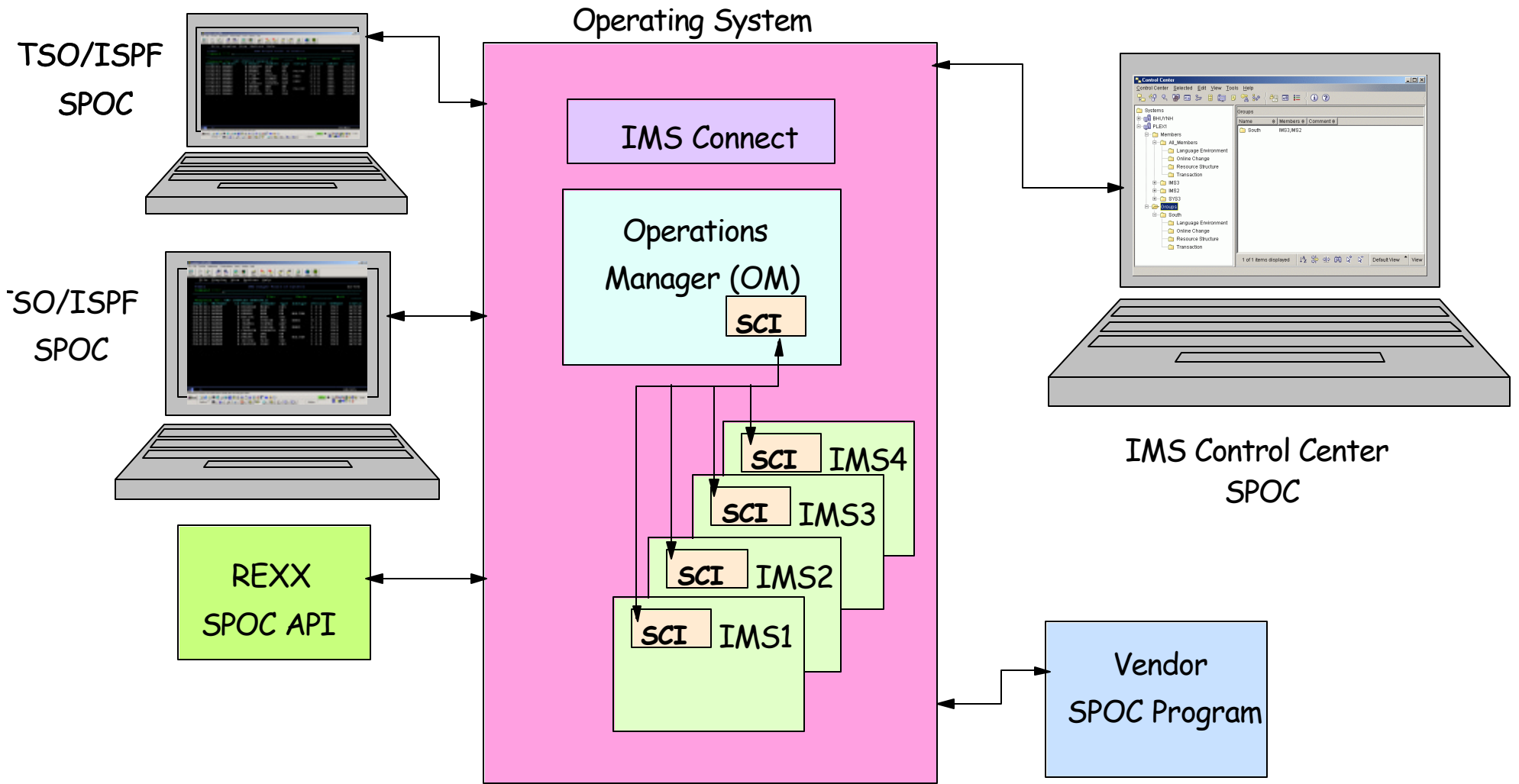
► Vendor or user developed SPOC

- A program written to use or access OM API to perform SPOC functions

"Single" does not mean "only" ! Can have more than one type of SPOC in an IMSplex and any number of SPOCs active



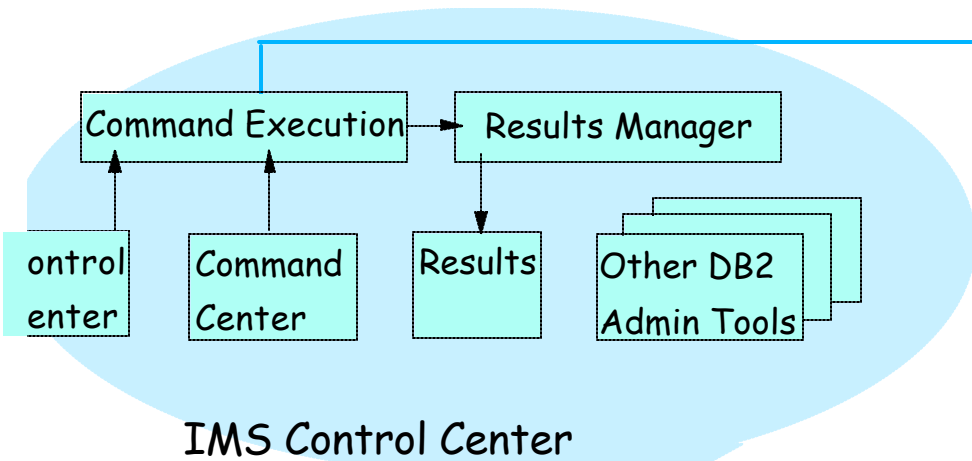
Multiple SPOC Users in an IMSplex



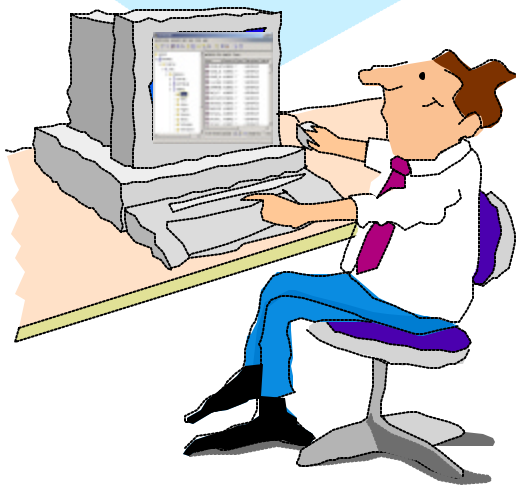
IMS Control Center



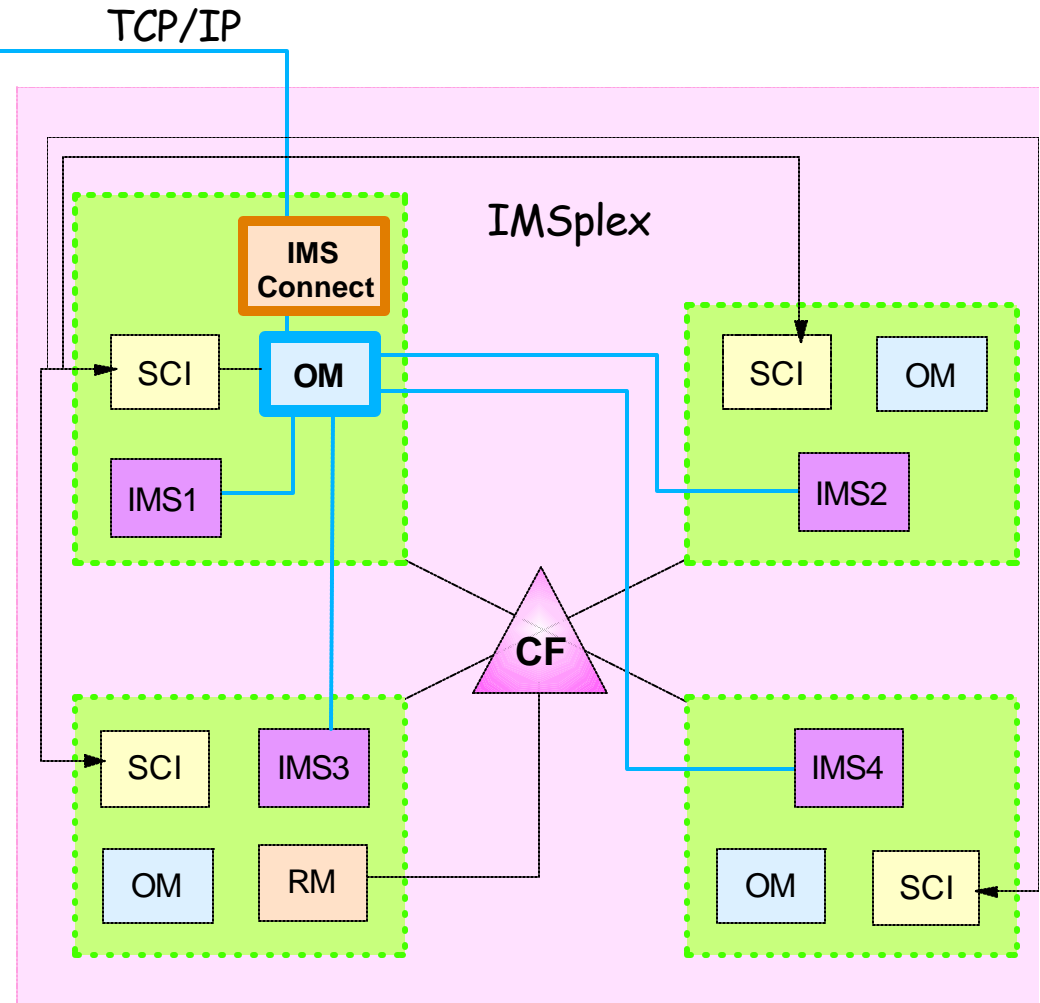
IMS1,2,3 & 4 could be DM/TM or DBCTL Configurations



IMS Control Center



SPOC



IMS Control Center

Translation Languages

✦ IMS Control Center user interface and help translated into the following languages

- Brazilian
- Portuguese
- Danish
- Finnish
- French
- German
- Italian
- Japanese
- Korean
- Norwegian
- Polish
- Russian
- Simplified Chinese
- Spanish
- Swedish
- Traditional Chinese



IMS Control Center

OM API

✦ Control Center Input:

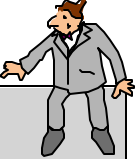
- QRY IMSPLEX NAME(CSLPLEX1)SHOW(JOB,SUBTYPE,STATUS,TYPE)

✦ OM API input:

- CMD (QRY IMSPLEX NAME(CSLPLEX1)SHOW(JOB,SUBTYPE,STATUS,TYPE))

✦ OM API output:

```
<?xml version="1.0"?><!DOCTYPE imsout SYSTEM "imsout.dtd">
imsout>
<ctl>
<omname>OM1OM </omname><omvsn>1.1.0</omvsn>
<xmlvsn>1</xmlvsn>
<statime>2002.163 15:05:18.859217</statime>
<stotime>2002.163 15:05:18.860443</stotime>
<staseq>B7C4A41E663D11C3</staseq>
<stoseq>B7C4A41E6689B9C3</stoseq>
<rqsttkn1>USRTABC 10080518</rqsttkn1>
```



OM response is returned encapsulated in XML tags. Control Center does the parsing of the response.



IMS Control Center

OM API...

✦ Control Center Output:

- The QUERY IMSPLEX command displays the IMSplex members that compose IMSplex CSLPLEX1. This IMSplex contains three IMSs (IMS1, IMS2, and IMS3), a TSO SPOC (USRT011), a CQS (CQSRE1), RM (RM1), an IMS Connect (IMSCONT) and OM (OM1).
- OM1 is the command master that built the output.

IMSplex	MbrName	CC	Member	JobName	Type	Subtype	Status
CSLPLEX1	OM1OM	0	IMS2	IMS2	IMS	DBDC	READY,ACTIVE
CSLPLEX1	OM1OM	0	CQS1CQS	CQSRE1	CQS		ACTIVE
CSLPLEX1	OM1OM	0	SYS3	IMS1	IMS	DBDC	READY,ACTIVE
CSLPLEX1	OM1OM	0	OM1OM	OM1	OM		READY,ACTIVE
CSLPLEX1	OM1OM	0	IMS3	IMS3	IMS	DBDC	READY,ACTIVE
CSLPLEX1	OM1OM	0	USRT011	USRT011	AOP		ACTIVE
CSLPLEX1	OM1OM	0	RM1RM	RM1	RM	MULTRM	READY,ACTIVE
CSLPLEX1	OM1OM	0	SCI1SC	SCI1	SCI		READY,ACTIVE
CSLPLEX1	OM1OM	0	IMSCONT	IMSCONT	IMSCON		ACTIVE



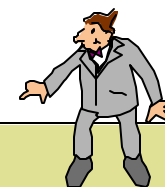
IMS Control Center

Command Center – Classic Command Results

The screenshot shows the 'Command Center' application window. The 'Command type' is set to 'IMS commands'. The 'System' field is empty. The 'Results history' dropdown is set to 'DIS ACT'. The 'IMS sysplex' is 'PLEX1', 'Command master' is 'IMS3', and 'Route' is 'ALL_MEMBERS'. The 'Results' tab is selected, showing a table of message data for member IMS3.

Member	Message Data						
	REGID	JOBNAME	TYPE	TRAN/STEP	PROGRAM	STATUS	CLASS
IMS3		JMPRGN	JMP	NONE			
IMS3		MSGRGN	TP	NONE			
IMS3		JBPRGN	JBP	NONE			
IMS3		BATCHREG	BMP	NONE			
IMS3		FPRGN	FP	NONE			
IMS3		DBTRGN	DBT	NONE			
IMS3		DBRRCTCC	DBRC				
IMS3		DLIRCTCC	DLS				
IMS3	VTAM	ACB	CLOSED				
IMS3		IMSLU=N/A	N/A		APPC STATUS=DISABLED	TIMEOUT=	0
IMS3		CTMA	CROUP=N/A		STATUS=NOTACTIVE		

At the bottom of the window, there is a button labeled 'Display Results in New Window'.



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



TSO SPOC QUERY IMSPLEX example

Response for: **QUERY IMSPLEX SHOW(ALL)**

IMSpIex	MbrName	CC Member	JobName	Type	Subtype	Version	OSName	Status
CSLPLEX1	OM1OM	0 CQS1CQS	CQSMBR	CQS		1.3.0	ECDVL39	ACTIVE
CSLPLEX1	OM1OM	0 IMS2	IMS2	IMS	DBDC	8.1.0	ECDVL39	ACTIVE
CSLPLEX1	OM1OM	0 OM1OM	OM	OM		1.1.0	ECDVL39	ACTIVE
CSLPLEX1	OM1OM	0 SYS3	IMS	IMS	DBDC	8.1.0	ECDVL39	ACTIVE
CSLPLEX1	OM1OM	0 SCI1SC	SCI	SCI		1.1.0	ECDVL39	ACTIVE
CSLPLEX1	OM1OM	0 RM1RM	RM	RM	MULTRM	1.1.0	ECDVL39	ACTIVE
CSLPLEX1	OM1OM	0 USRT005	USRT005	AOP		1.1.0	ECDVL39	ACTIVE
CSLPLEX1	OM1OM	0 IMS3	IMS3	IMS	DBDC	8.1.0	ECDVL39	ABENDED



OM - Support

- ★ **User Exits**
- ★ **Security**
- ★ **Setup**



OM - User Exits

User may write user exits for the OM address space

- ▶ All exits are optional
- ▶ No samples are provided

Users exits are defined in BPE User Exit List proclib member

- ▶ Example:

```
EXITDEF= ( TYPE=xxx , EXITS= ( XXX , YYY ) , COMP=OM )
```

- ▶ OM and BPE definition addressed in later section

OM Client Connection User Exit

```
TYPE=CLNTCONN
```

- ▶ Called when client registers or deregisters commands with OM and indicated it is ready to accept commands
- ▶ Called again when client deregisters from OM



OM - User Exits ...

OM Initialization/Termination User Exit

TYPE=INITTERM

- ▶ Called after OM completes initialization/termination
- ▶ Called after each CSL configured IMS syplex completes initialization/termination
- ▶ Not called for abnormal termination

OM Input User Exit

TYPE=INPUT

- ▶ Called to view command text received from AO client before it's processed
 - Can change command text or reject command



OM - User Exits ...

OM Output User Exit

TYPE=OUTPUT

- ▶ Called when command response received from CP client before it is sent to AO client
 - Can change response text
- ▶ Also called when OM receives unsolicited output
 - For example, late reply

OM Security User Exit

TYPE=SECURITY

- ▶ Called when CMDSEC=A or E
 - After Input User exit
 - After RACF if CMDSEC=A
- ▶ On exit
 - Can accept or reject command
 - Can override RACF

Security described in more detail in
Definition and Operations



OM Command Security

Choice of OM command security or IMS command security

- ▶ OM command security checking uses RACF OPERCMDS class
- ▶ SMU security is not supported through the OM API

Resource Name Format is IMS.plexname.verb.keyword :

- ▶ IMS
- ▶ IMS sysplex name
- ▶ Name of the command verb
 - verb is the short form of the command verb
- ▶ Primary command keyword or resource type for the command

/DISPLAY TRAN command resource name:

IMS.plexname.DIS.TRAN

RACF access authority must match IMS command registration

- ▶ READ
 - /DISPLAY
- ▶ UPDATE
 - /CHANGE



OM - Command Security

RACF definition examples

* Allow CHANGE TRAN command on any IMSplex for userid ME

- ▶ IMS.plexname.CHA.TRAN
- ▶ RDEFINE OPERCMDS IMS.*.CHA.TRAN UACC(NONE)
- ▶ PERMIT IMS.*.CHA.TRAN CLASS(OPERCMDS) ID(ME) ACCESS(UPDATE)

* Allow any DISPLAY command on any IMSplex for userid YOU

- ▶ IMS.plexname.DIS.TRAN
- ▶ IMS.plexname.DIS.DBD
- ▶ RDEF OPERCMDS IMS.*.DIS.* UACC(NONE)
- ▶ PERMIT IMS.*.DIS.* CLASS(OPERCMDS) ID(YOU) ACCESS(READ)

SETROPTS CLASSACT(OPERCMDS)

SETROPTS RACLIST(OPERCMDS) REFRESH



OM -CSLOlxxx Proclib member

OM Initialization Parameters Proclib Member

ARMRST=Y|N

- ▶ Specifies if Automatic Restart Manager should restart OM after an abend
 - Default = Y

CMDSEC=A|E|N|R

- ▶ Specifies the security method to be used for OM command security
 - A both RACF or equivalent AND the OM Security Exit are to be called
 - E only the OM Security User Exit is called
 - N no security
 - R only RACF or equivalent is called

OMNAME=

- ▶ Specifies the name for the OM address space.
 - Value = 1-6 character name



OM -CSLOIxxx Proclib member . . .

OM Initialization Parameters Proclib Member

CMDLANG=ENU

- ▶ Language used for IMS Command text distributed to OM command client
 - Default value=ENU
 - Used by IMS Control Center

CMDTEXTDSN=

- ▶ Specifies the dataset name for the PDS that contains the command syntax translatable text.
 - Required parameter.
 - Used for "QUERY(CMDSYNTAX)" type of request
 - OM appends CMDLANG=value to "CSLOT" to create pds member to read

IMSPLEX(NAME=plexname)

- ▶ Specifies definitions for an IMS sysplex managed by OM. Required parameter. Only one IMSPLEX keyword may be specified
- ▶ plexname
 - A 1-5 character identifier that specifies the XCF CSL IMSplex group name. OM concatenates this identifier to "CSL" to create XCF CSL IMSplex group name. All OM, RM, SCI, IMS address spaces in the same IMS sysplex must specify the same identifier.



OM - CSLOIxxx Example

Example of the contents of OM Proclib member CSLOIxxx:

```
ARMRST=Y                /* ARM should restart OM on failure */
CMDLANG=ENU             /* IMS Command Language CSLOTENU*/
CMDSEC=R                /* Use RACF security for commands */
IMSPLEX(NAME=PLEX1)    /* Group name (XCF Group = CSLPLEX1 */
OMNAME=OM1              /* OM Name (OMID = OM1OM) */
CMDTEXTDSN=IMS.OM.TRANSLATABLE.TEXT
```



OM - Startup JCL example

OM started with JCL or started procedure

- ▶ Started independent of other CSL address spaces

```
//CSLOM01 PROC SOUT=A,RGN=4M
//          BPECFG=BPECONFG
//STEP1 EXEC PGM=BPEINI00,TIME=1440,
//          PARM=('BPEINIT=CSLOINI0,BPECFG=&BPECFG,ARMRST=,
//          OMINIT=123,OMNAME=,CMDLANG=,CMDSEC=')
//*
//STEPLIB DD DSN=IMS.SDFSRESL,DISP=SHR
//PROCLIB DD DSN=IMS.PROCLIB,DISP=SHR
//SYSPRINT DD SYSOUT=&SOUT
//SYSUDUMP DD SYSOUT=&SOUT
```

BPE CSL
program

CSL - OM
startup
module

OM CSLOI proclib member



OM - Startup

OM initialization issues CSLSCREG request to register with SCI.

- ▶ If SCI is not started then CSL0003A is issued
- ▶ Timer set to wait six(6) seconds to retry SCI registration
- ▶ Maximum of ten(10) SCI registration retries then
 - issue CSL0002E message
 - abend OM U0010 subcode X'538'



OM - shutdown

- ▶ OM address space
 - CSLZSHUT client request
 - CSLZSHUT FUNC=QUIESCE,SCOPE=CSLMEMBER, MBRNAME=OM member name
 - STOP command
 - P omjobname

OM issues CSL0300I completes command in progress then shuts down



OM Statistics Available Through BPE Statistics Exit

BPE Statistics User Exit

- ▶ Optional User Exit
- ▶ Used to gather BPE and OM statistics

OM statistics include the following:

- ▶ Number of Registratrion/De-registrations
- ▶ Number of Command request
- ▶ Number of active IMS sysplex clients
- ▶ Number of times commands have timed out



OM Summary

OM is a required address space in the CSL environment

- ▶ Must have at least one OM in the IMSplex
- ▶ Exception: If using SCI only for DBRC ARLN

OM's primary function is to ...

- ▶ Provide a common API for command entry to any or all IMSs in an IMSplex
- ▶ Route commands to any or all IMSs in the IMSplex and consolidate command responses from multiple IMSs

Commands

- ▶ New IMSplex command can be entered only through the OM API
 - INITIATE, TERMINATE, QUERY, UPDATE, DELETE
- ▶ Classic commands can be entered through OM; for example ...
 - /STOP xxx /START xxx /DISPLAY xxx
- ▶ Not all classic commands can be entered through OM; for example ...
 - /SIGN ON /RCLDST /EXIT

