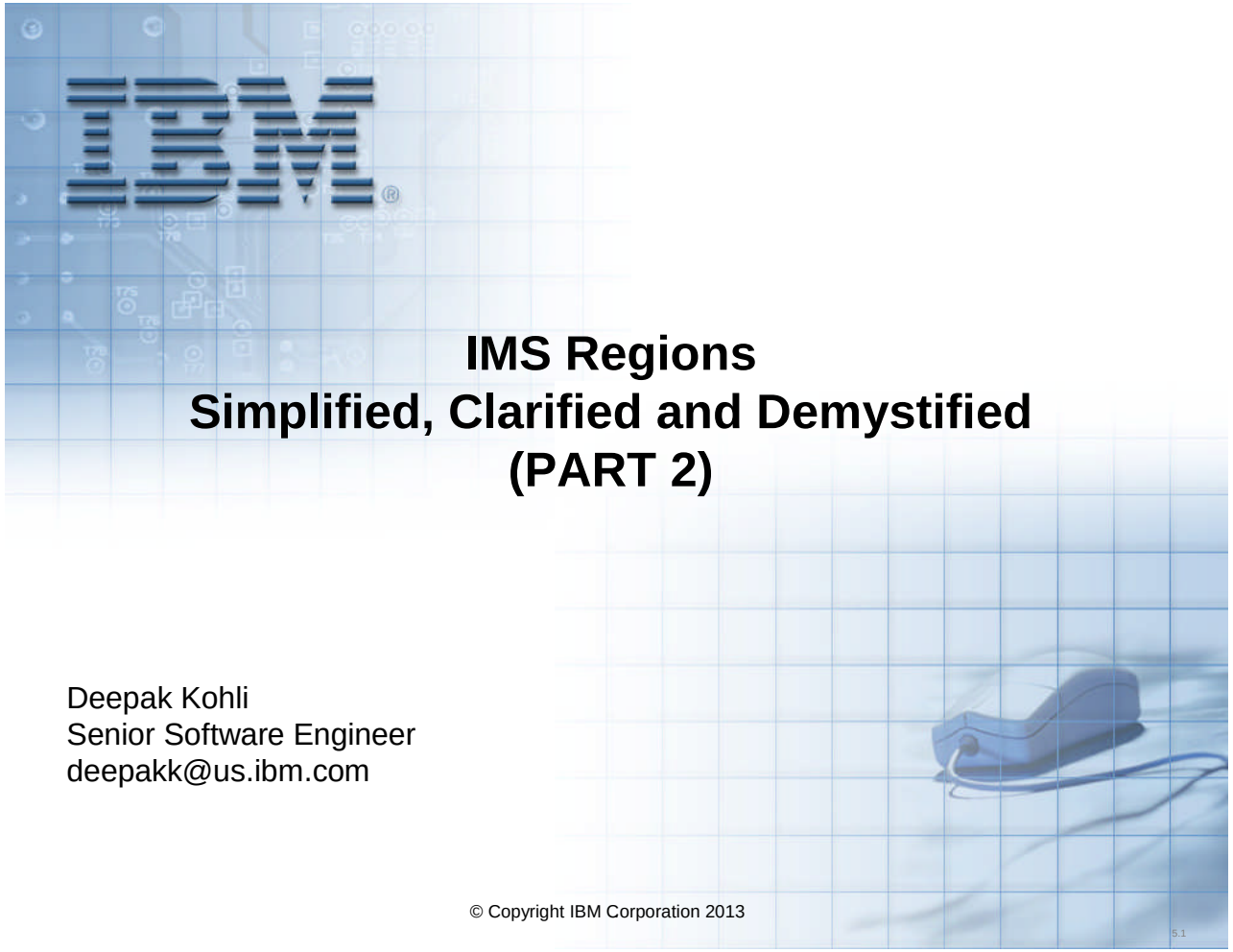


IMS Regions
Simplified, Clarified and Demystified
(PART 2)

Deepak Kohli
Senior Software Engineer
deepakk@us.ibm.com

Part 2 Agenda

- Announcements
- Quick Part 1 review
- MSC & ISC
- IMS Connect (ICON)
- Common Service Layer (CSL)
  - SCI
  - OM
  - RM
  - ODBM
- IMS Repository server

Announcements:
IMS 13
YouTube
IMS Forum

IMS Version 13

- IMS 13, IMS 13 DB VUE & IMS Enterprise suite 3.1 announced October 1, 2013

- IMS 13, IMS 13 DB VUE & IMS Enterprise Suite 3.1 GA date: October 25, 2013

100,000 transactions per second, on a single IMS system, sustained!

IMS 13: Highest Efficiency, Lowest TCO

- **IMS 13's 100,000 trans per second was actually:**

117, 292 trans per second

- **Free IMS 13 Teleconference on October 29, 2013, register at:**

  http://www-01.ibm.com/software/os/systemz/webcast/oct29/

  Speakers: Betty Patterson & Carlos Alvarado

IMS goes YouTube

- IMS Educational videos will be available on YouTube
- First Video coming out: An Introduction to IMS
- Goal is to have videos on different IMS topics
  - Each video should be roughly 20 – 30 minutes or shorter

IMS Forum

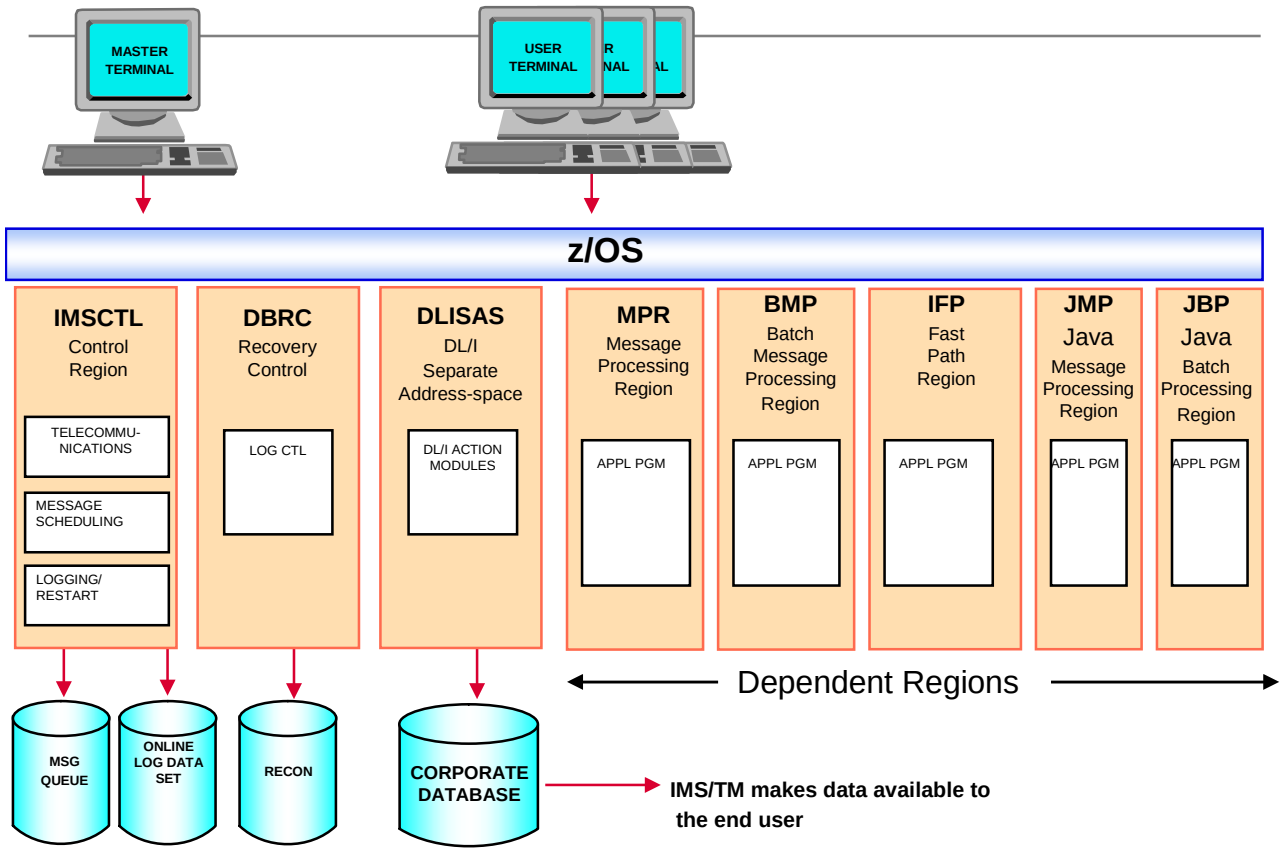
- **Questions?**

- *Please post your questions on the IBM IMS forum on Linkedin*

  - *comments on videos, IMS Teleconferences*
  - *Technical questions*
  - *Topic suggestions for IMS YouTube videos or IMS Teleconferences*
  - *Any thing else that's on your mind*

Quick Part 1 Review

IMS Architecture Overview

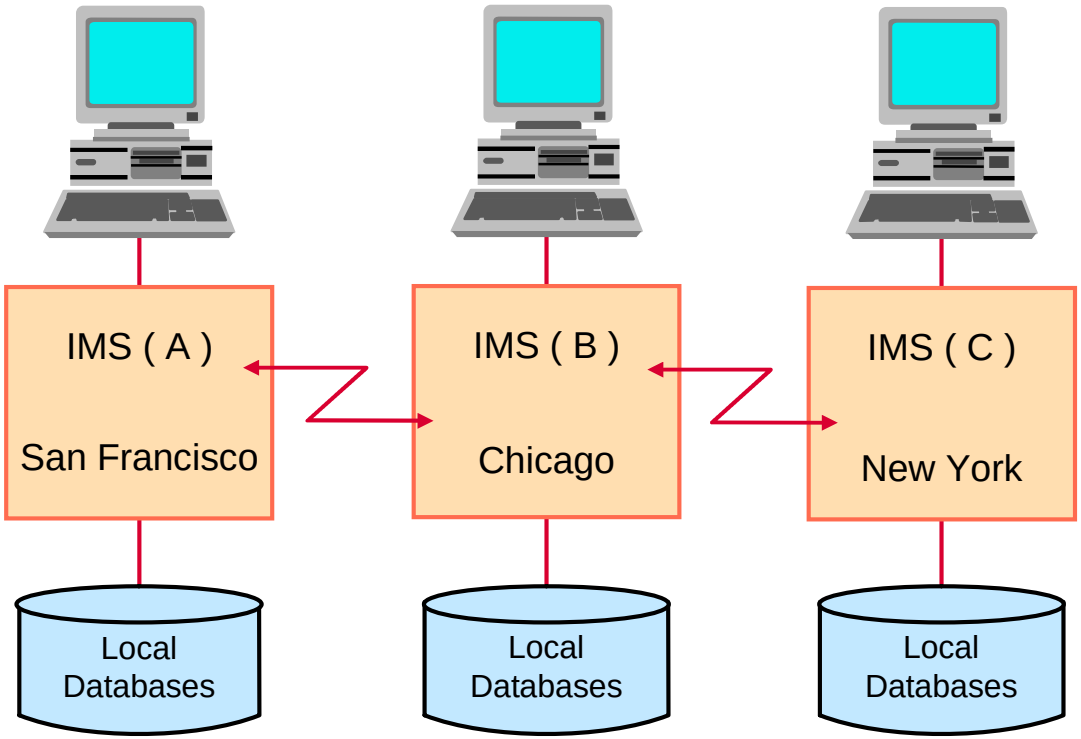


MSC & ISC

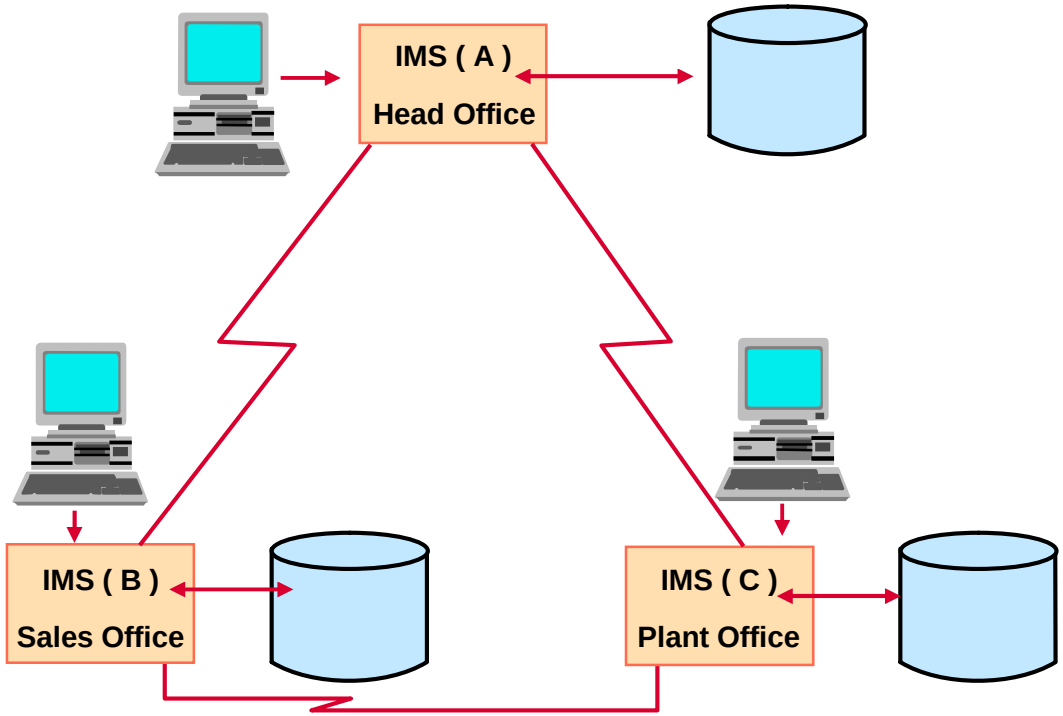
Multiple Systems Coupling (MSC)

- Allows for the distribution of IMS transactions between IMS subsystems
  - Transactions entered from one IMS subsystem may be processed on another IMS subsystem
- IMS-to-IMS configuration only
  - Each system is a complete IMS subsystem
- Transactions may be *routed* via:
  - VTAM communication line or over TCP/IP (introduced with IMS V12)
  - Channel-to-Channel (CTC) Adapter
  - Main Storage-to-Main Storage (MTM) Link (within one z/OS image)
- Routing is automatic via IMSGEN process
  - No application program or end-user need be involved

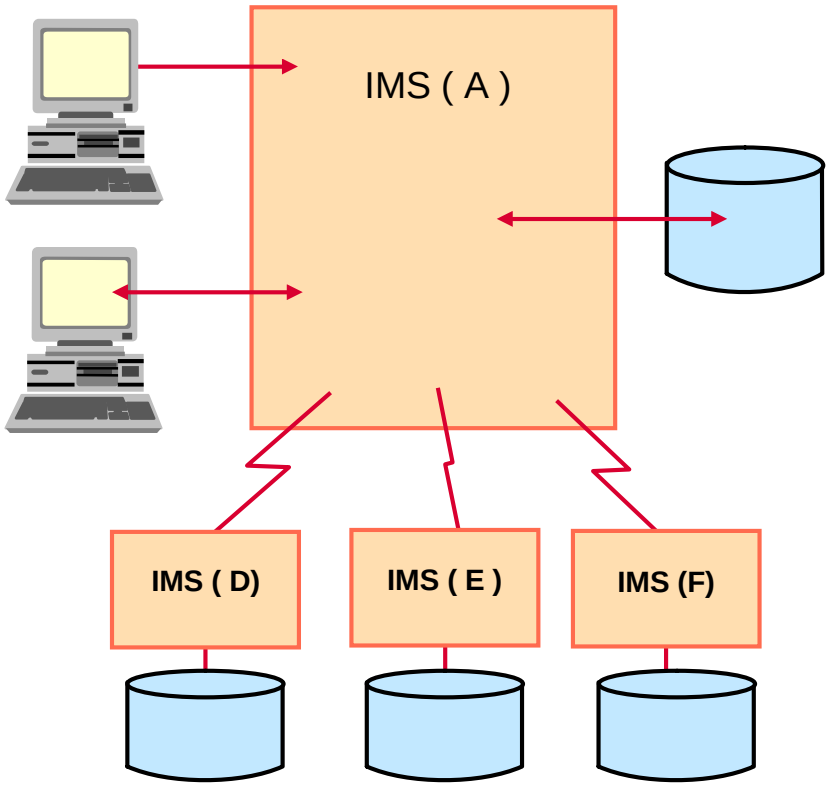
Distributed databases



Distributed applications



Increased capacity

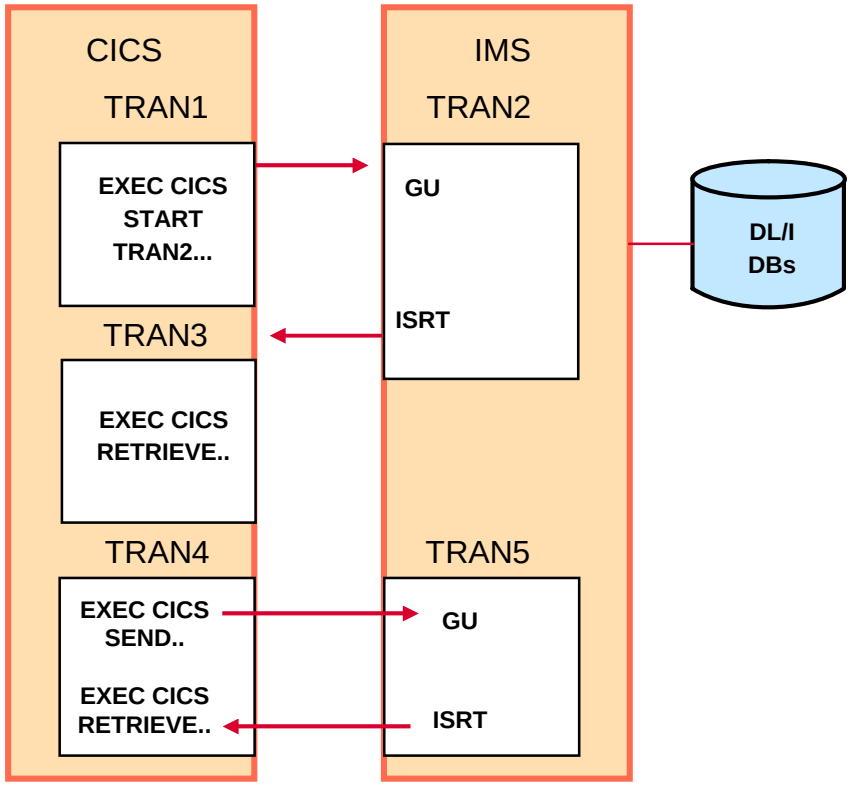


Inter-System Communications (ISC)

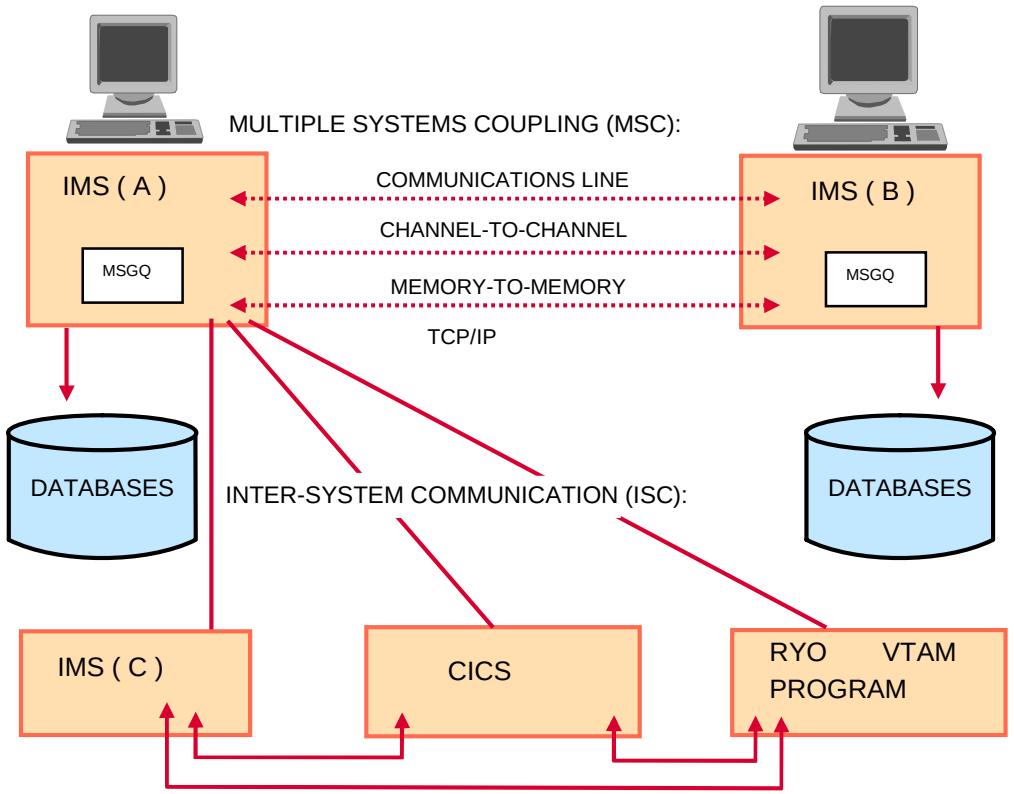
- Allows for routing of transactions between Subsystems:
  - IMS to IMS (between like subsystems)
  - IMS to CICS or CICS to (between unlike subsystems)
  - IMS to RYO (between unlike subsystems)
- Implementation of LU 6.1 protocol
- Transactions may be *routed* over
  - VTAM communication or
  - TCP/IP (introduced in IMS 13)
- Routing is NOT via IMSGEN process but
  - Done between application programs in the two subsystems
  - The subsystems themselves are session partners, supporting logical flows between the applications

CICS-IMS connectivity

- CICS-to-IMS scenarios:



MSC / ISC summary

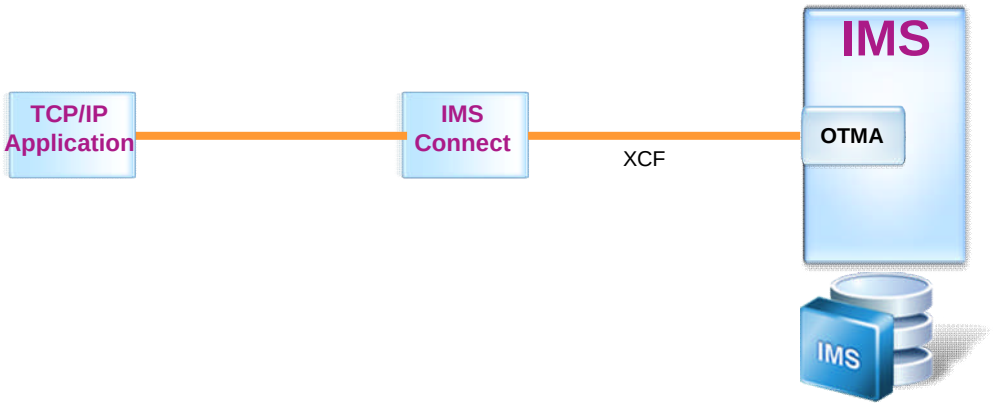


IMS Connect (ICON)

IMS Connect

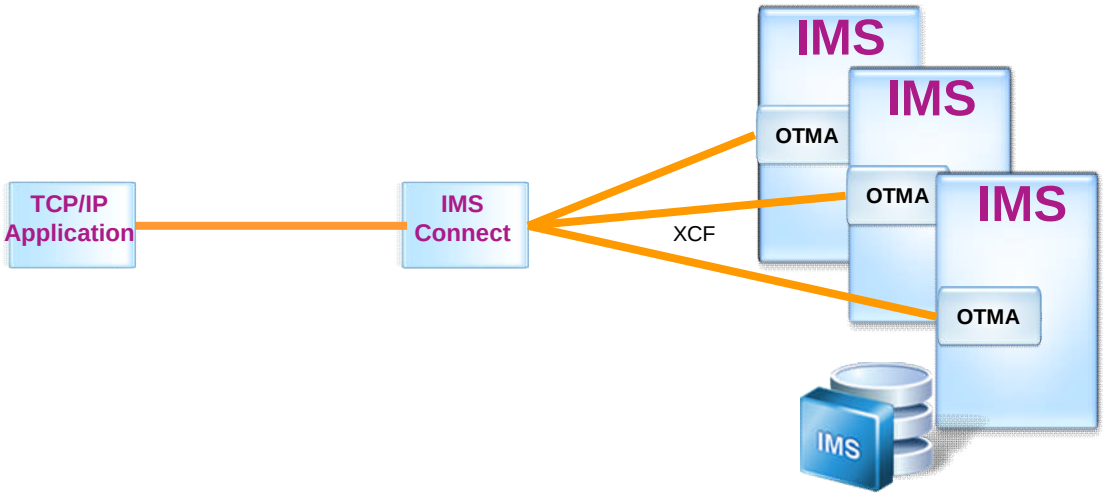
- **IMS Connect is the TCP/IP interface for IMS**
  - IMS Connect is delivered with IMS
    - It is not an additional product
  - IMS Connect runs in a separate address space
  - IMS Connect is a TCP/IP Server
  - IMS Connect is used for:
    - Submitting IMS transaction messages over TCP/IP
    - Accessing IMS data (IMS Open Database) over TCP/IP
    - MSC over TCP/IP
    - ISC over TCP/IP
    - Application Remote Messaging

Submitting IMS transaction messages over TCP/IP



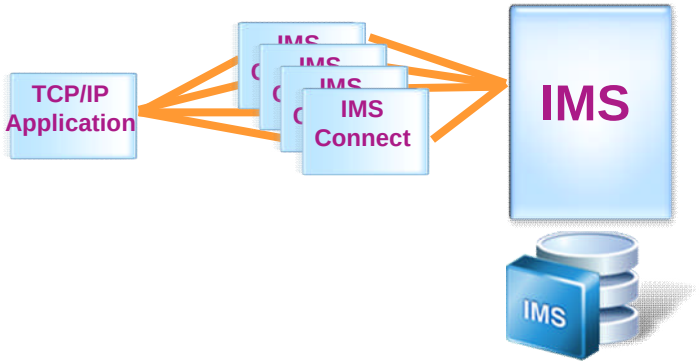
- IMS Connect and IMS communicate using XCF (cross-system coupling facility)
  - i.e IMS Connect and IMS do not have to be on the same LPAR
- IMS Connect and IMS interface thru OTMA (Open Transaction Manager Access
- IMS Connect provides exit routines for transaction message formatting

One IMS Connect to Many IMSs



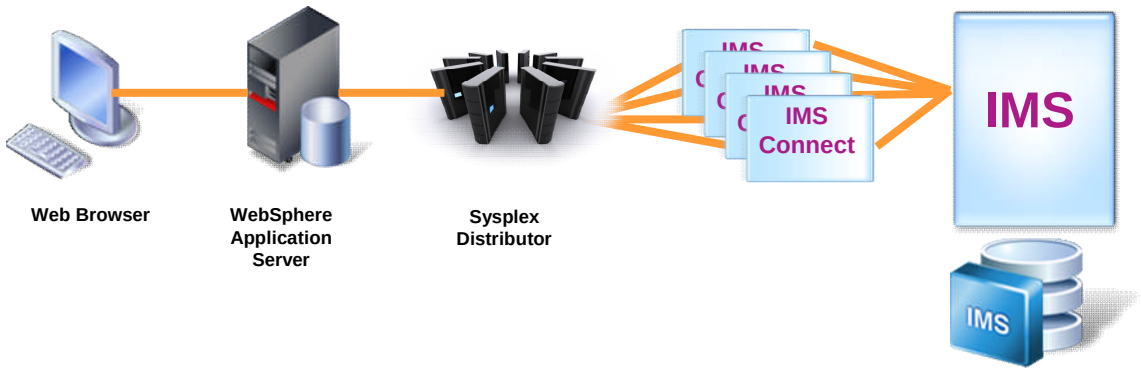
- IMS Connect can communicate with multiple IMSs
  - IMS Connect could do load balancing across the IMSs
- IMS Connect can know the status of the IMSs
  - So if an IMS is unavailable, IMS connect could re-direct the transaction to another IMS

Several IMS Connects to one IMS



- Several IMS Connects could communicate with one IMS
  - Might want to do that for availability

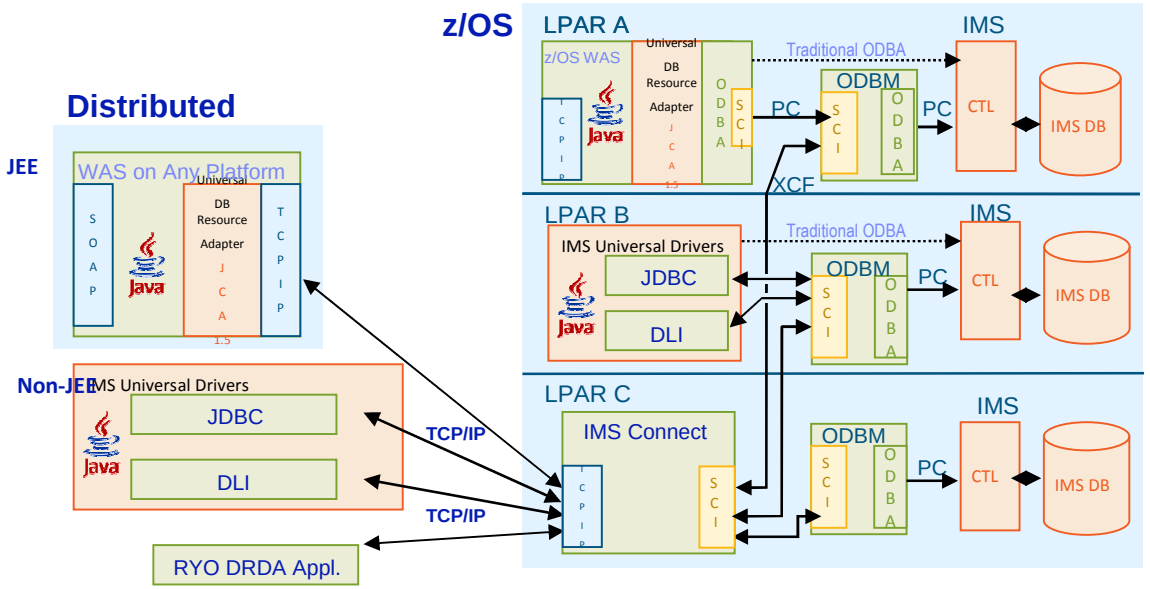
Using IMS Connect with Sysplex Distributor



- Can front end IMS connect with Sysplex Distributor (A software function in z/OS that increases availability through a combination of dynamic VIPA and the z/OS Workload Manager).

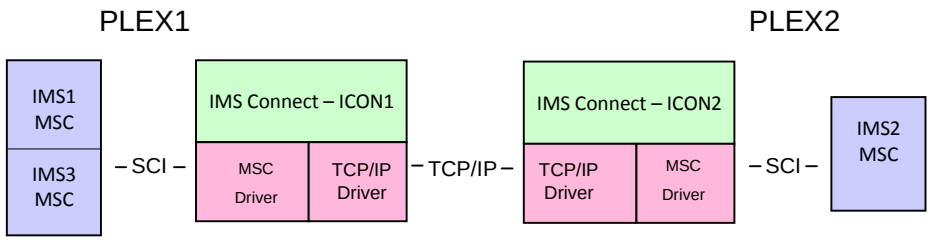
IMS Connect – Open Database

- **IMS Open Database**
  - IMS Connect is the TCP/IP portal for access to IMS data



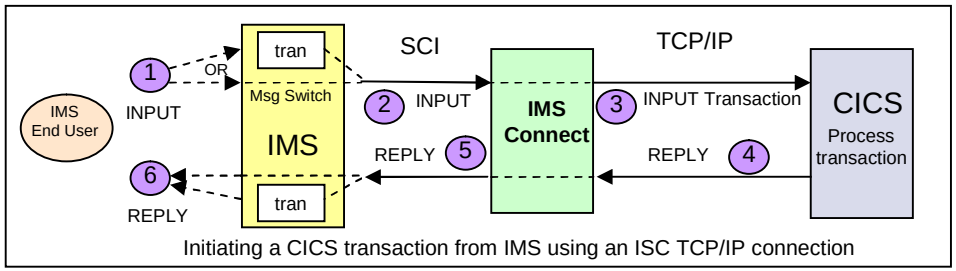
IMS Connect – MSC over TCP/IP

- **MSC over TCP/IP (introduced in IMS 12)**
  - Isolates TCP/IP from the IMS Control Region
    - Uses the existing IMS Connect TCP/IP support
  - Supports communication with IMS via the Structured Call Interface (SCI)

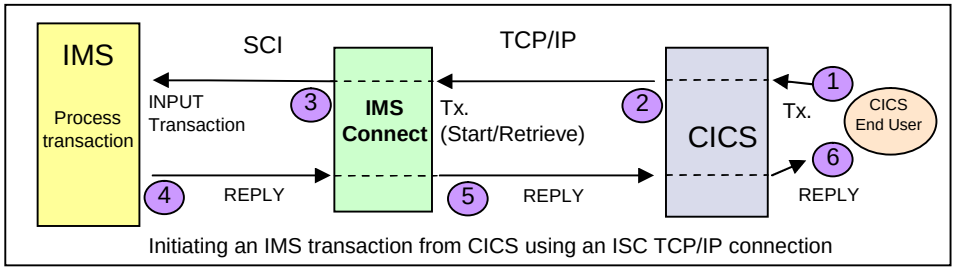


IMS Connect – ISC over TCP/IP

- **ISC over TCP/IP (introduced in IMS 13)**
  - IMS or CICS can initiate the request



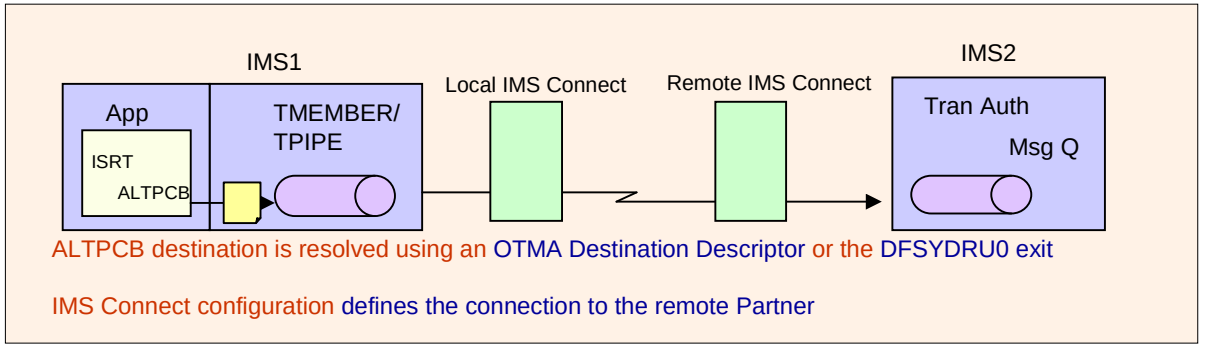
Initiating a CICS transaction from IMS using an ISC TCP/IP connection



Initiating an IMS transaction from CICS using an ISC TCP/IP connection

IMS Connect – Async IMS to IMS Messages over TCP/IP

- **Application Remote Messaging (introduced in IMS V12)**
  - OTMA
    - Sends OTMA remote ALTPCB messages to IMS Connect using new destination information
      - OTMA destination descriptors or DFSYDRU0 exit Routine
  - IMS Connect
    - Receives OTMA ALTPCB messages from a local IMS and sends them to the remote IMS Connect for processing in the remote IMS
      - Enhanced IMS Connect configuration specifications
  - Eliminates the need for a customer RYO Gateway application to receive output message and send it to the other IMS



IMS Connect Extensions

- **IMS Connect Extensions provides features and functions to enhance the usability, control, and operation of IMS Connect**
  - Comprehensive event recording for IMS Connect internal events, which can be used for basic reporting and problem analysis
  - Allow users to monitor and display IMS Connect activity and utilization in real time
    - ISPF and Eclipse GUI interfaces
  - Enhance IMS Connect availability by dynamically managing workloads
  - Improve system security by providing a greater degree of access control

IMS Connect Extensions

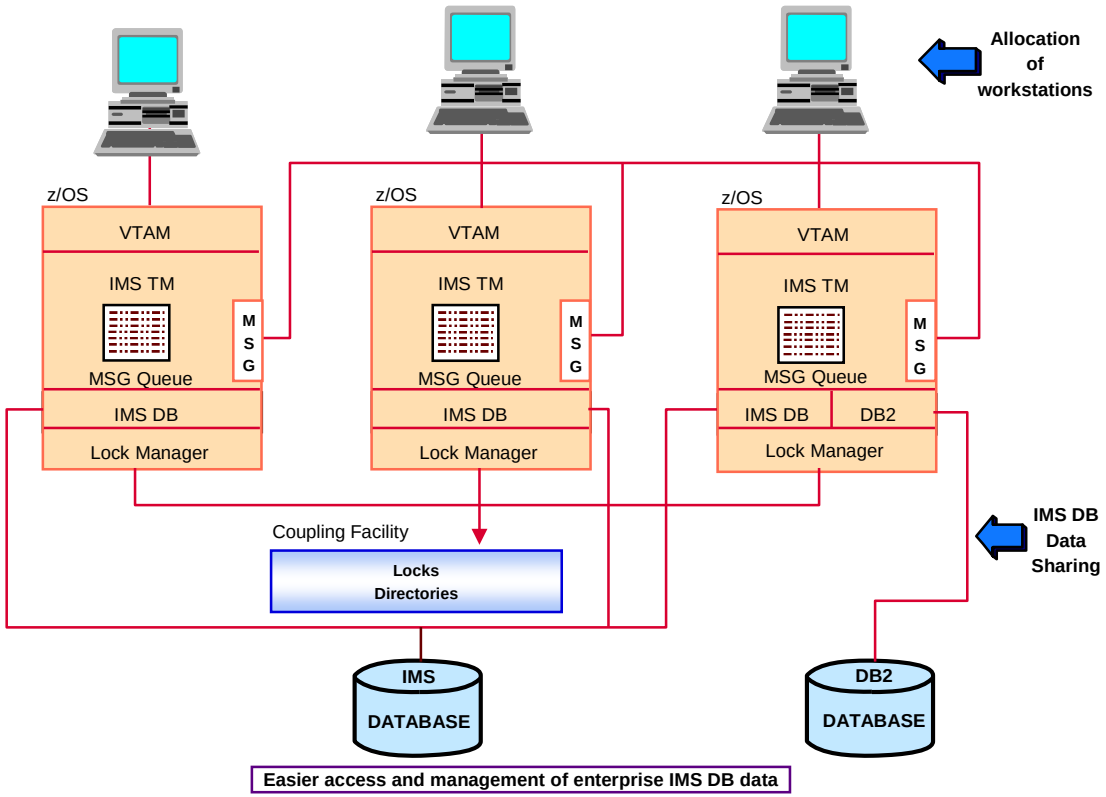
- **Features Include**
  - Event collection and logging
    - Logs can be used and integrated with IMS Performance Analyzer (IMSPA) and IMS Problem Investigator (IMSPI)
  - Status monitoring
  - User Message Exit Management
    - Add, Reload, Delete, Disable, Enable
  - Message management
    - RACF checking
    - Routing messages to available datastores
    - Rules based routing
    - Message control including timeout, expiry, cancel client, etc.
    - Message flood management
  - Support for IMS Open Database

Common Service Layer (CSL)

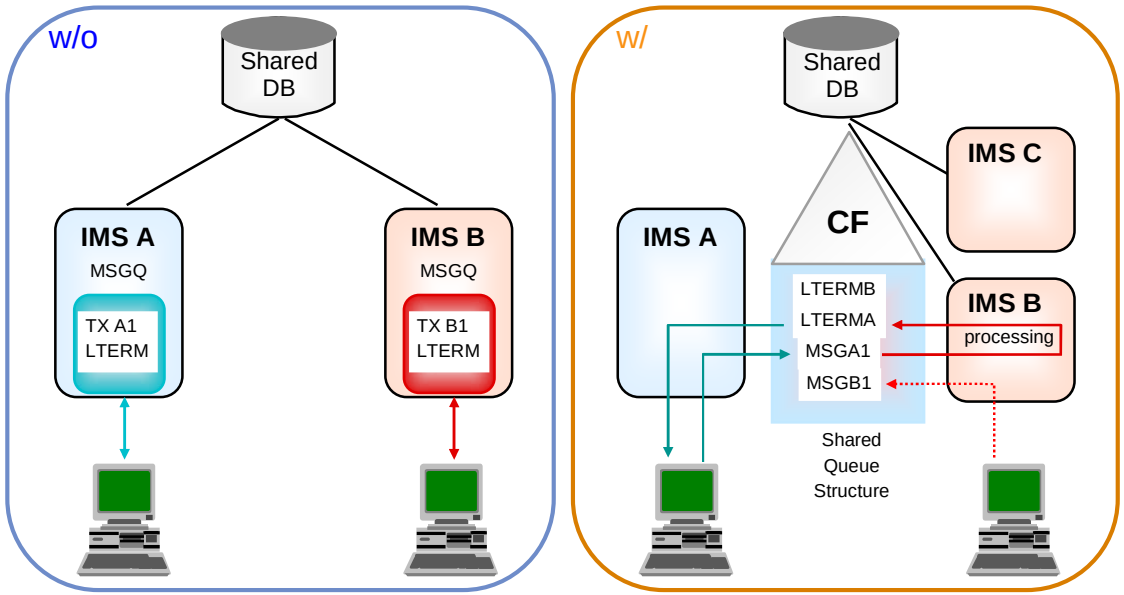
Address Spaces to discuss

- Common Queue Server (CQS) – for managing objects on a coupling facility
- Common Service layer address spaces:
  - OM
  - RM
  - SCI
  - ODBM
- But first lets talk about Sharing IMS resources

IMS Data Sharing in a Parallel Sysplex

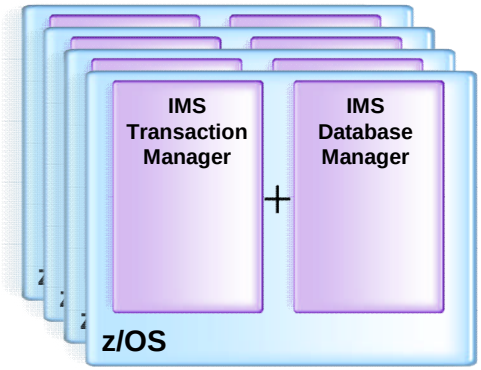


IMS shared queues



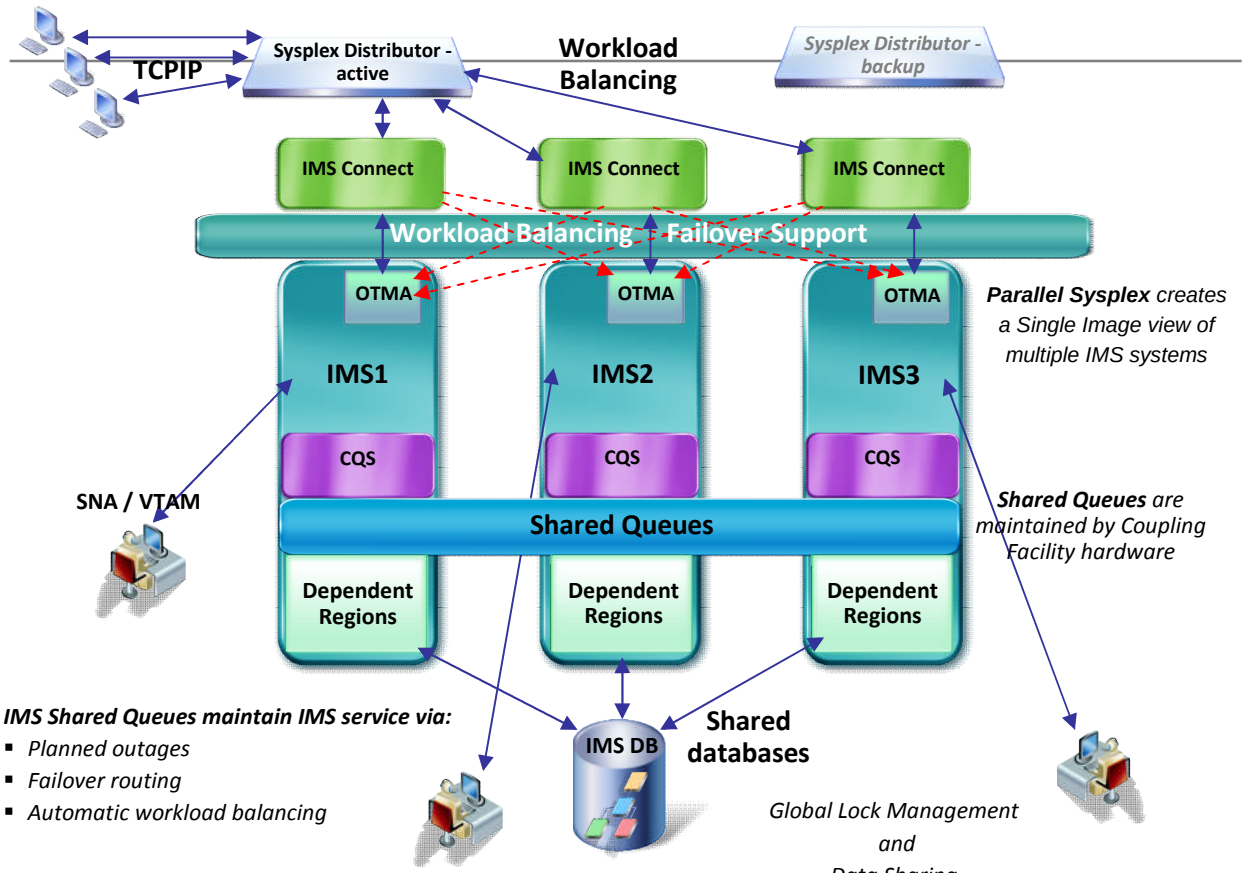
Clustering and Workload Management

- **Clusters: sets of servers that are managed together and participate in workload management.**
- **IMS cluster = IMSPlex**
- **IMS images can be clustered up to 255 at a time but managed as one system**



- **Share IMS databases**
- **Share IMS message queues**
- **Single Point of Control**

IMS for High Availability



IMS Shared Queues maintain IMS service via:

- *Planned outages*
- *Failover routing*
- *Automatic workload balancing*

Common Service Layer (CSL) Overview

- An architecture to improve the systems management capabilities for IMS systems
  - Operations management (Operations Manager)
  - Communication ability between IMSplex components (Structured Call Interface)
  - Resource management (Resource Manager)
  - IMS Open Database access (Open Database Manager)

- Benefits
  - Provides a single system image (IMSplex)
  - Ease of use through a single point of control
  - Shared resources across all IMS systems
  - Reduces complexity of managing multiple IMS systems

Common Service Layer (CSL) Components

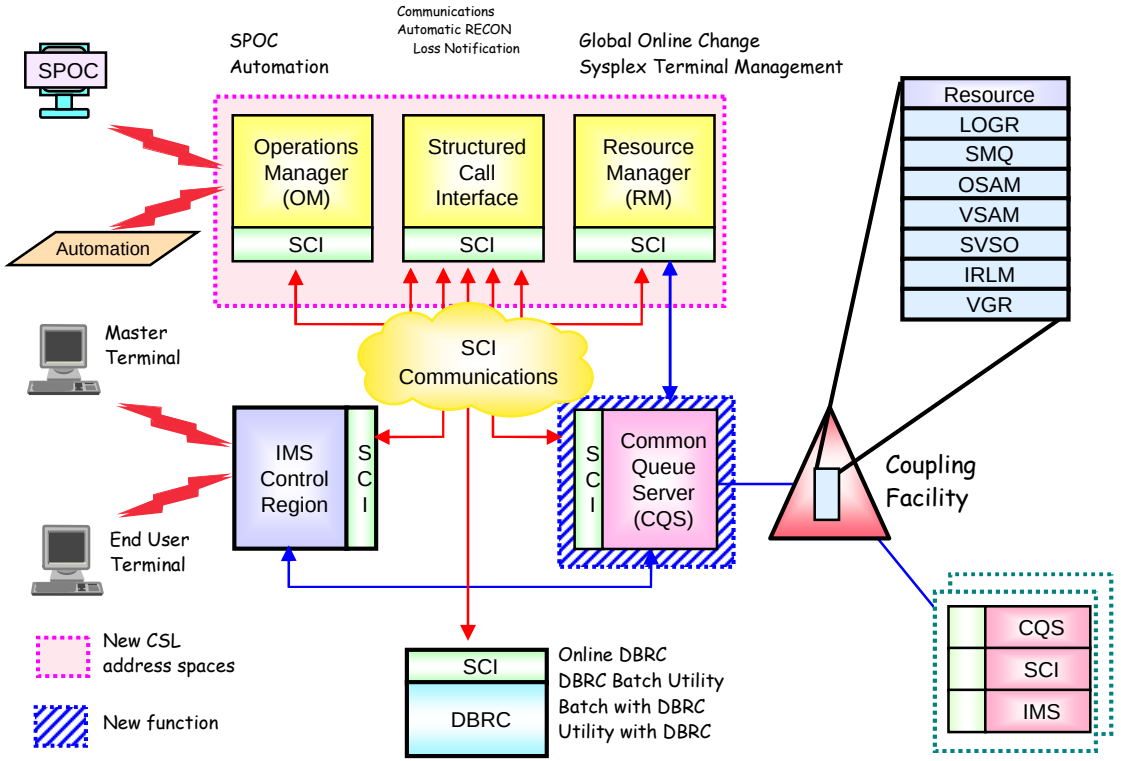
- Structured Call Interface (SCI)
- Operations Manager (OM)
- Resource Manager (RM)
- Open Database Manager (ODBM)

Each has an address space

- Can use CQS (Common Queue Server)

- CF structures (optional)
  - Resource, shared queues

CSL architecture



Structured Call Interface (SCI) Overview

- Provides communications services among IMSplex members in a single z/OS image and across multiple z/OS images in an IMSplex
- Provides the following services
  - Member registration services (security)
    - OM, RM, CQS, ODBM, IMS, SPOC, IMS Connect, DBRC
  - Communications services
- Used for the following functions
  - Automatic RECON Loss Notification (ARLN) (IMS 8)
  - Parallel RECON Access (PRA) (IMS 10)
  - Database Quiesce (IMS 11)
- One SCI address space is required on each z/OS image where CSL is active

Resource Manager (RM) Overview

- Provides infrastructure for managing global resources and IMSplex-wide processes
  - IMS is responsible for exploiting RM services
- Provides the following services
  - Maintains global resource information using a resource structure in a Coupling Facility
  - Coordinates IMSplex-wide processes
- Used for the following functions
  - Sysplex Terminal Management (STM) (IMS 8)
  - Global Online Change (GOLC) (IMS 8)
  - Global Callable Services (IMS 8)
  - Global Status (IMS 10)
  - ACBLIB Member Online Change (IMS 10)
  - Database Quiesce (IMS 11)

Operations Manager (OM) Overview

- Provides ‘single point of control’ for command entry into an IMSplex
  - Focal point for operations management and automation
- Provides the following services
  - 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
  - Support for new IMSplex commands (type-2 commands) and for existing IMS commands (type-1 commands)
  - An API for IMS commands for automation
  - Command security for authorization using RACF or equivalent plus user exit
  - User exit capability for editing command input and responses
- Configuration
  - One or more OM address spaces required per IMSplex

Open Database Manager (ODBM) Overview

- Supports open standards for distributed and local Java application program connectivity to IMS databases (IMS 11)
- Provides the following services
  - IMS Universal Drivers
  - Works with IMS Connect using DRDA for distributed access (type-4)
  - Works through DRA (Database Resource Adapter) interface for local access within a z/OS LPAR or across z/OS LPARs (type-2)
- Used for the following functions
  - Open Database (IMS 11)
- One ODBM address space is required on each z/OS image that contains databases to which ODBM clients (such as the IMS Universal Drivers) require access per IMSplex

IMS Repository Server

History of IMS Resource definition

- IMS SYSGENs (IMSGEN)
  - Been around since day 1
  - Resources defined by coding macros & then running jobs (Stage 1 & Stage 2) to assemble & link edit the macros into RESLIB
  - Cold start of IMS required to take effect
- Online Change for MODBLKs, ACBLIB, FMTLIB (IMS V3.1 or 1.3?)
  - DATABASE, APPLCTN, TRANSACT & RTCODE
  - One resource could prevent OLC from completing
  - Multiple IMSs in an IMSPLEX could be challenge
    - Coordinated Online Change
- DRD with RDDSs (IMS V10)

IMS 10 Dynamic Resource Definition (DRD)

- DATABASE, PROGRAM, TRANSACT and Fast Path RTCODE macros can be optionally removed from the IMS GEN
  - Replaced by definitions in System **R**esource **D**efinition **D**atas**s**ets (RDDSs)
- IMS generally acquires these “MODBLKS resources” at cold start
- Changes can be made using CREATE, DELETE and UPDATE type-2 commands
  - Superior and non-disruptive alternative to online change of MODBLKS dataset
  - TSO SPOC enhanced to include a DRD GUI - “Manage Resources” ISPF application
  - Can submit changes in batch using the Batch SPOC
- Changes are **logged**, and **saved to next system RDDS** in cycle **at the next system checkpoint**
- Traditional online change is still available
  - Still needed for ACB or MFS changes

IMS Repository Function Overview

- A ‘repository’ is a generalized data storage facility that can be used to store various types of information
- The IMS repository function is a centralized method for storing and retrieving resource definitions in an **IMSplex***
  - Enables multiple IMS systems in a multiple-IMS IMSplex to manage, store, share, and retrieve resource definitions
  - Enables a single IMS system in a single-IMS IMSplex to manage, store, share, and retrieve resource definitions
- Focus is on improving the **systems management** and resource management aspects of handling IMS resource definitions
  - Across **multiple** IMSs or for a **single** standalone IMS
  - For test systems, for production systems

An “IMSplex” is an IMS with the Common Service Layer Components SCI, RM and OM defined

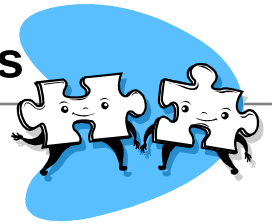
IMS Repository Function Usage …

- In IMS 12, the resource and descriptor definitions for Dynamic Resource Definition (DRD) can be stored in an IMS repository
  - Contains resource definitions for **programs/transactions/databases/FP routing codes & descriptors**
  - Called the IMSRSC (IMS resource) definition repository
  - Provides an **alternative** to using RDDSs (resource definition data sets) for DRD
    - Replaces one or more sets of RDDSs in an IMSplex with a single repository

IMS Repository Function Usage …

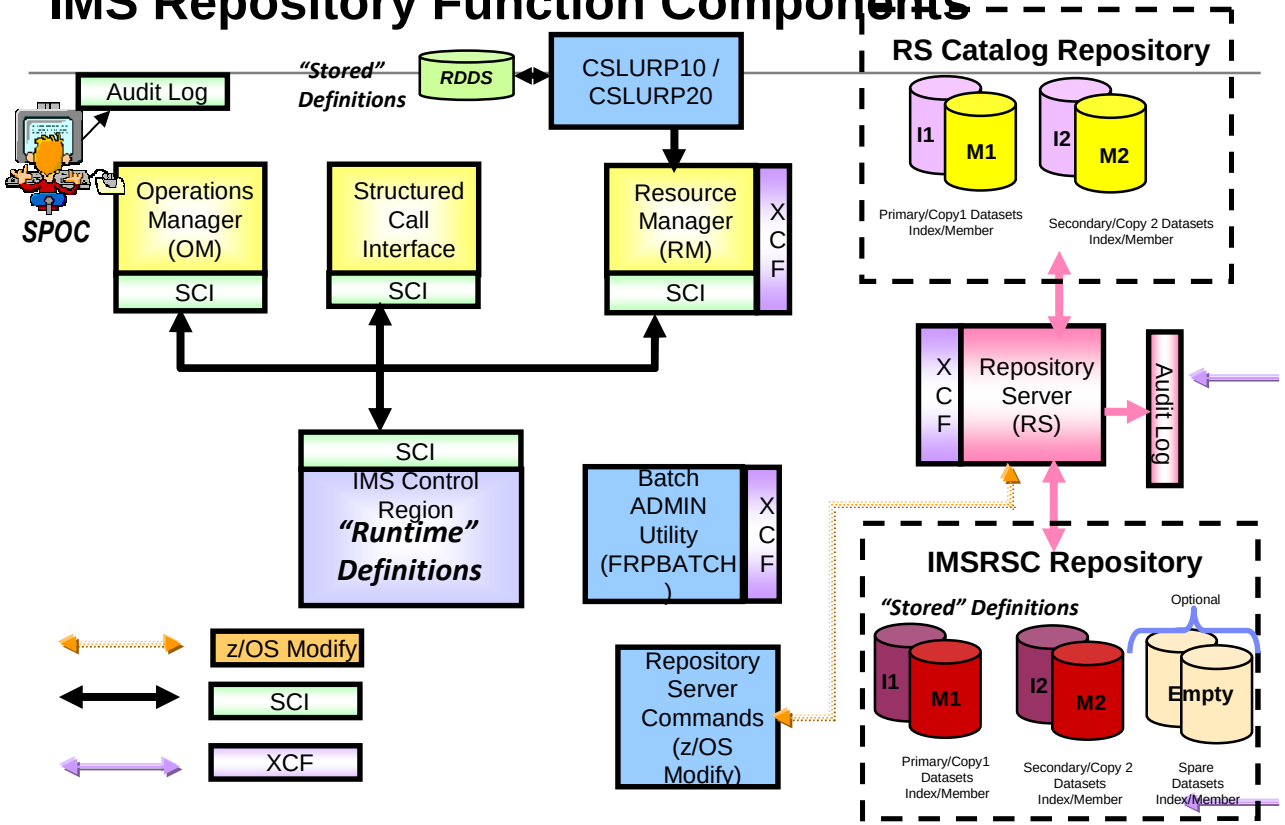
- In IMS 12, the resource and descriptor definitions for Dynamic Resource Definition (DRD) can be **stored** in an IMS repository (cont'd)
  - Eliminates the need to manually coordinate and manage separate RDDSs per IMS across a multiple-IMS IMSplex
  - Provides an **alternative** to using MODBLKS with SYSGEN and online change
  - **Considered a strategic alternative to the RDDS**
- IMS 12 can retrieve the **stored resource definitions** from the IMSRSC repository to dynamically generate **runtime resources** for DRD

IMS Repository Function Components



- Repository Server (RS) Address Space/s
- Repositories
  - Catalog repository
  - IMSRSC repository
- Common Service Layer (CSL) IMSplex configuration consisting of
  - Operations Manager (OM)
  - Resource Manager (RM)
  - Structured Call Interface (SCI)
  - SPOC for entering type-2 commands
  - **Optional** resource structure with CQS address space
- Batch utilities
  - Batch ADMIN utility
  - RDDS to / from repository utilities
  - **New** DRD utilities (**PM41218**)
    - MODBLKS to IMSRSC repository
    - IMS log to IMSRSC repository

IMS Repository Function Components



Thank you!

Questions?

Please post your questions on the IBM IMS forum on Linkedin

Other Topics you'd like to hear about?