



IMS Regions Simplified, Clarified and Demystified

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Part 1 Agenda

- IMS gets around (bragging about IMS)
- What is IMS?
- IMS Product Implementations
- IMS Online Architecture Overview
 - IMS Control Region
 - DBRC
 - DLISAS
 - IMS Dependent regions
 - MPR
 - IFP
 - BMP
 - JMP
 - JBP
- IMS DL/I Batch region
- IRLM
 - Data sharing
- Part 2 agenda

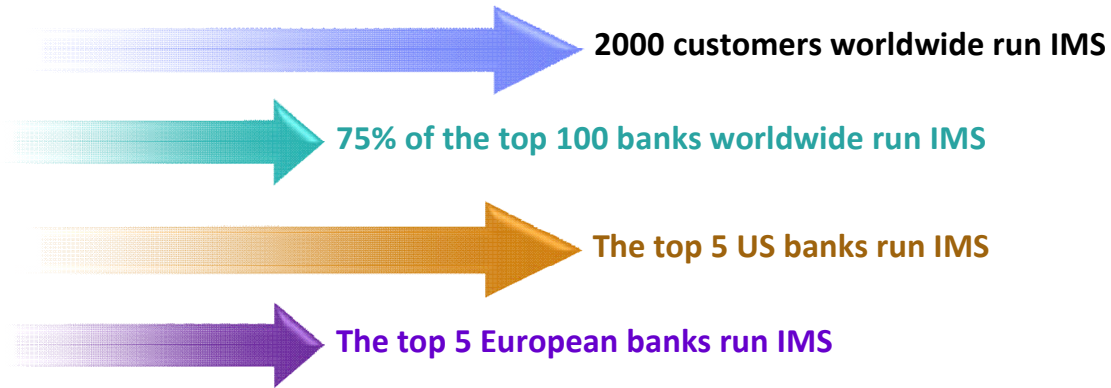
IMS Gets Around



IMS is part of our daily lives and has been for 45 years

We don't have to *think* about where the data that drives each of these scenarios resides, or how safe it is, or how quickly it's delivered, but we *have come to rely on it.....*

IMS runs the world's most critical workloads



16 petabytes of production data managed by IMS

\$3.0 trillion (\$US) per day is transferred through IMS.....by one customer

300+ million users served every day

500 million accounts.....for one customer

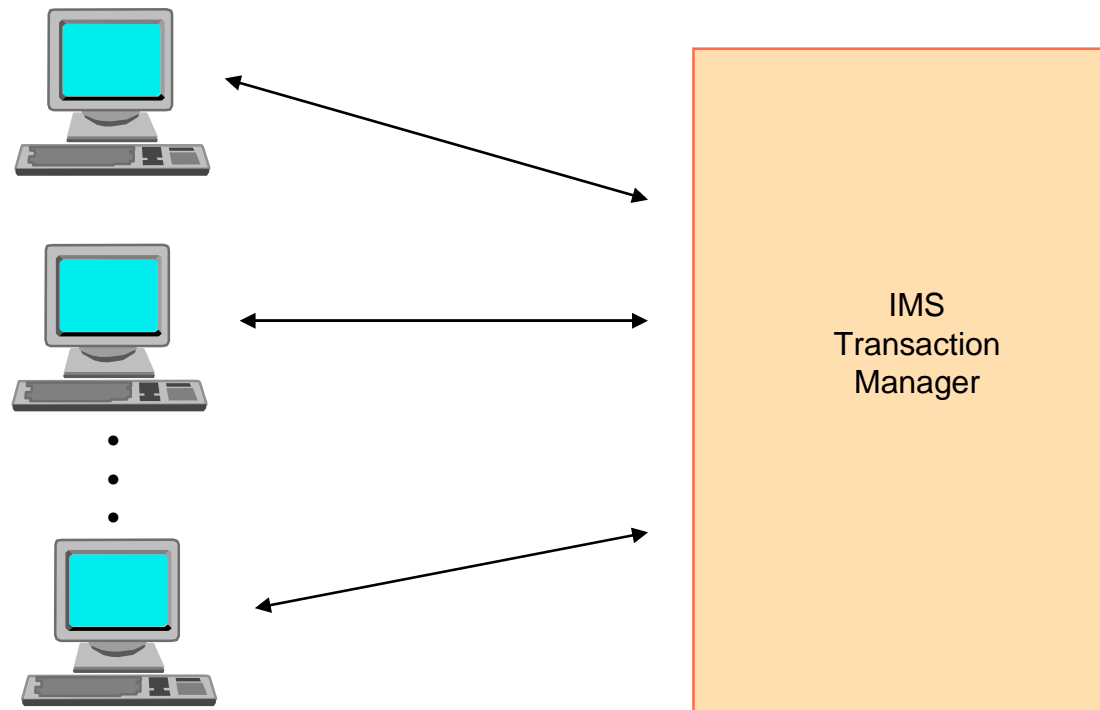
46,000 transactions per second.....on a single IMS system

What is IMS?

What is IMS?

- IMS = Information **M**anagement **S**ystem
- IMS MLC (Monthly License Charge) Products:
 - IMS Transaction Manager – IMS/TM
 - Old names: IMS DC (Data Communications), IMS TP (teleprocessing)
 - IMS Database Manager - IMS/DB
 - Hierarchical Database Management System
- IMS OTC (One Time Charge) Product:
 - IMS Database Manager Value Unit Edition (IMS/DB VUE)
 - Provides the same functionality as IMS/DB
 - First introduced in IMS V12
- All products run on the mainframe (z/OS) only
- Next version to GA will be IMS V13

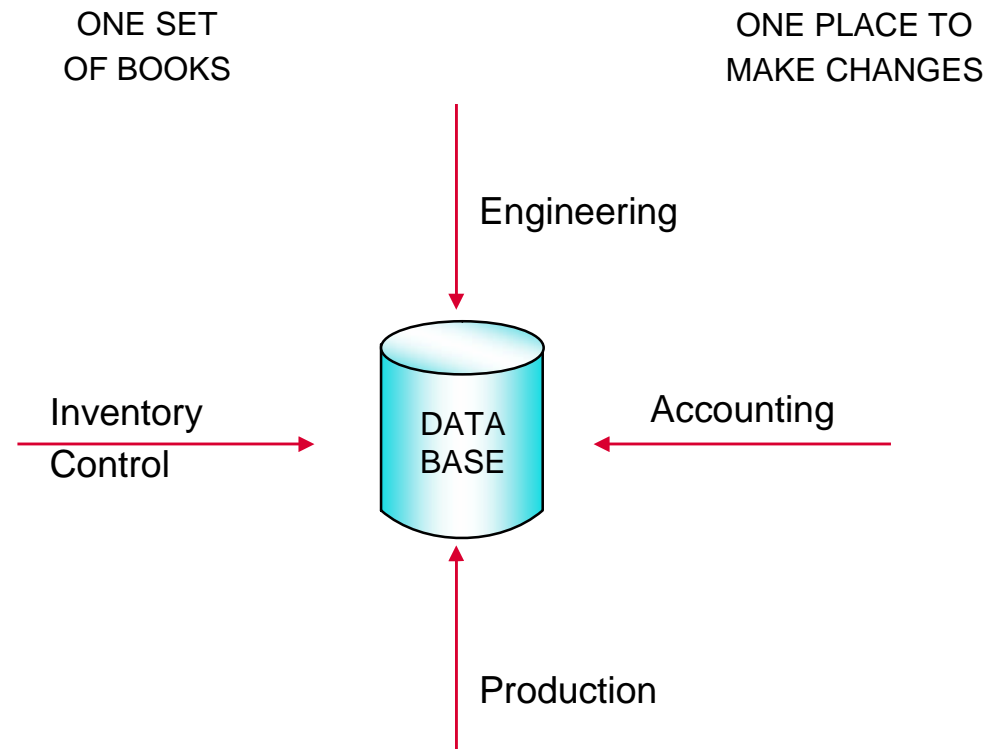
What's a Transaction Manager?



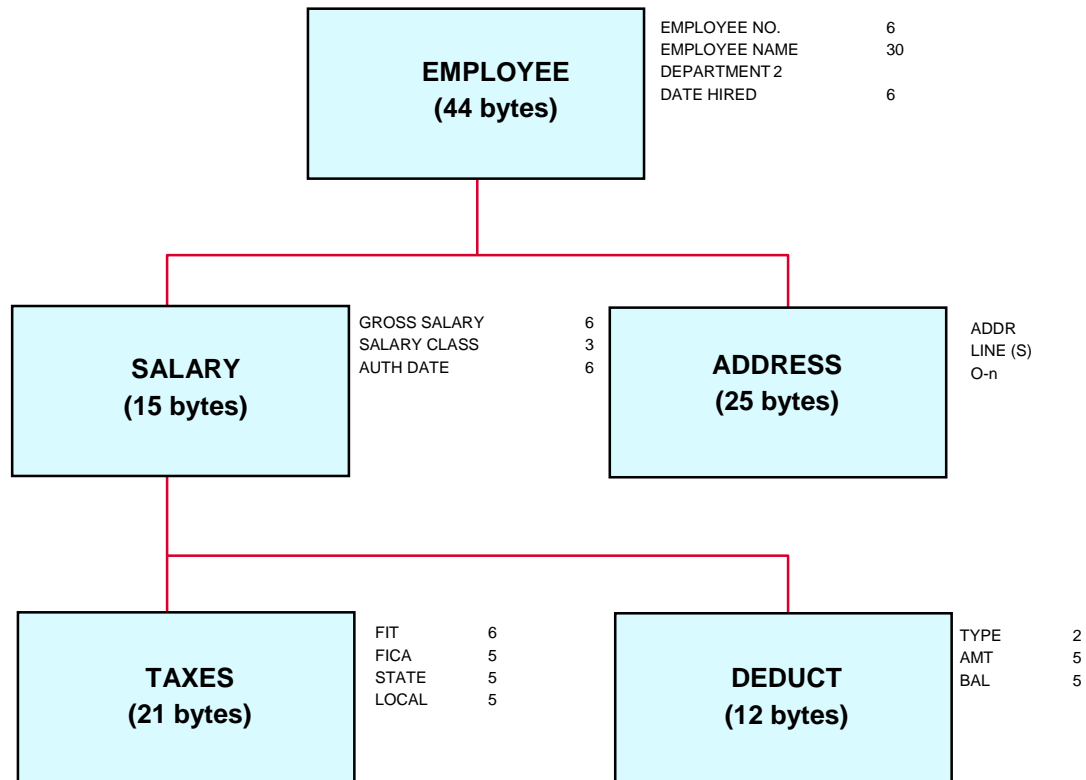
What Is a Database System?

- "A system that allows multiple independent users to have concurrent access to a central repository of information..."
- Advantages
 - Centralized files for all applications
 - Elimination of duplicate space and effort
 - Single information source provides complete, accurate information processing

A Central Repository



IMS DB: Hierarchical DBMS

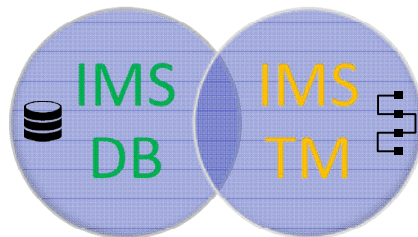


IMS DB Access

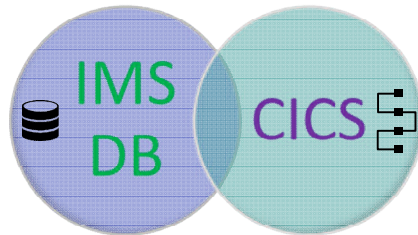
- Access to IMS databases via:
 - DL/I (Data Language Interface)
 - SQL (Structured Query Language)
- Started with IMS V7 and further enhanced with IMS V11's Open Database. And will further be enhanced in IMS V13

IMS Product Implementations

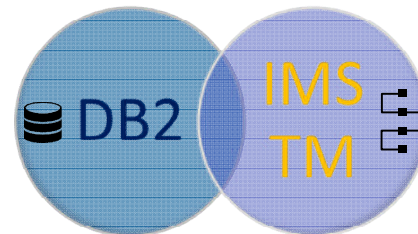
IMS Product Implementations



IMS Database Manager and IMS Transaction Manager on z/OS – sometimes referred to as IMS DB/TM or DB/DC



IMS Database Manager and CICS Transaction Server on z/OS – sometimes referred to as DB Control, or DBCTL



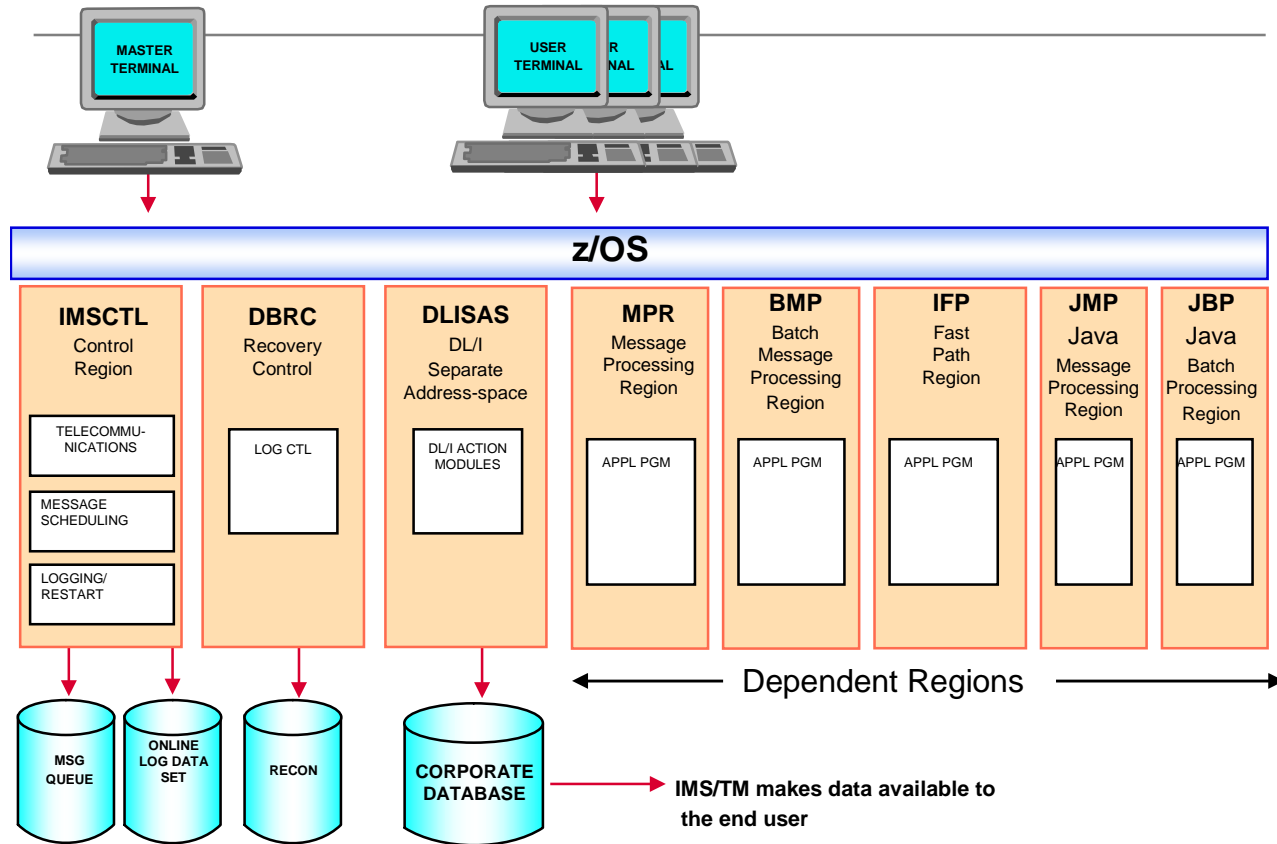
DB2 Database and IMS Transaction Manager on z/OS – sometimes referred to as DC Control, or DCCTL

IMS Product Implementations ...

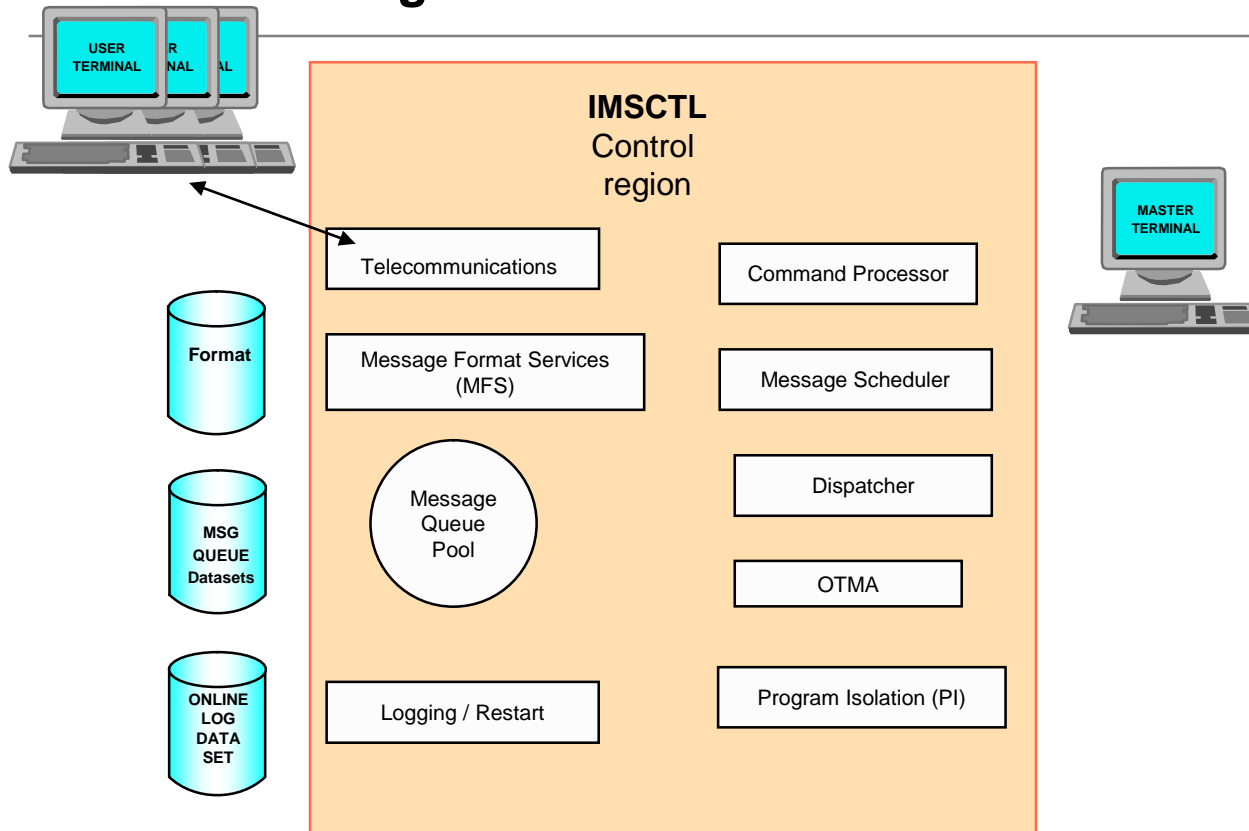
- During the IMS System definition, use the IMSCTRL SYSTEM= parameter to identify the system you want to define:
 - DB/DC
 - Builds an IMS™ system that includes both the Database Manager (DB) and Transaction Manager (DC)
 - DBCTL
 - Builds an IMS system that includes only the Database Manager
 - DCCTL
 - Builds an IMS system that includes only the Transaction Manager

*IMS Online Architecture
Overview*

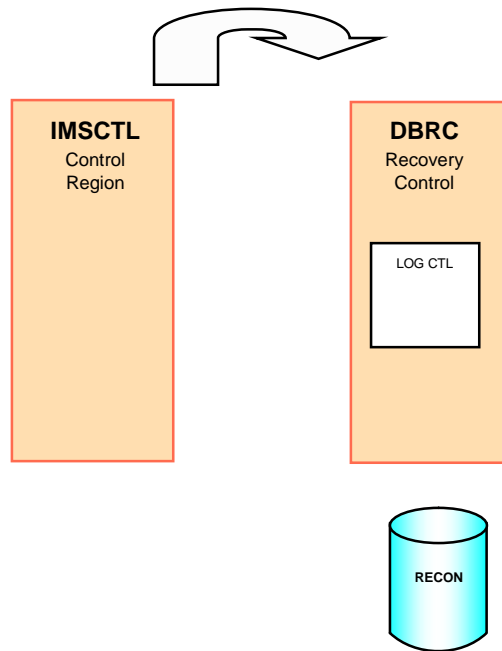
IMS Architecture Overview



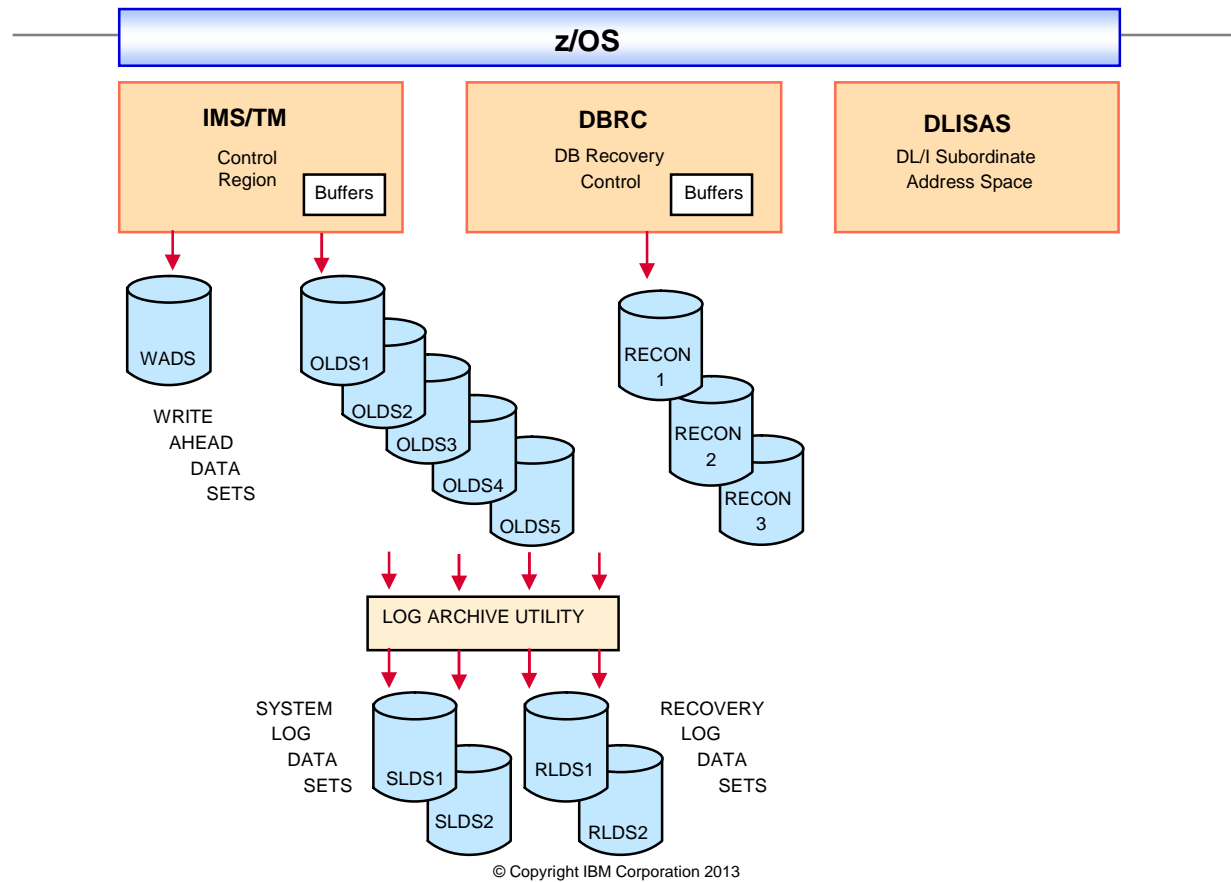
IMS Control region



DBRC (Data Base Recovery Control)



Common Logging Facility



"The RECON" for Log-Control

- Recovery Control Data Sets (RECON):
- Automatic recording of information about:
 - Online Log Data Set (OLDS)
 - System Log Data Set (SLDS)
 - Recovery Log Data Set (RLDS)
- Generation of utility JCL via DBRC command for:
 - Log Archive
 - Log Recovery

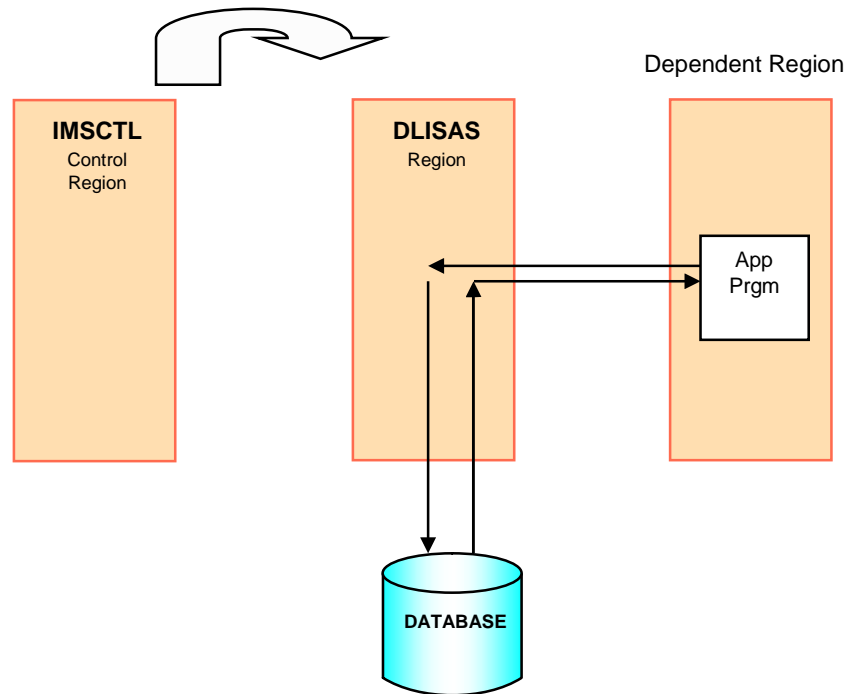
Database Recovery Control (DBRC)

- TWO LEVELS OF CONTROL:
 - LOG-CONTROL, controller of IMS log data sets:
 - Maintains information about OLDS status
 - e.g. ARCHIVE-NEEDED, AVAILABLE, ARCHIVE-IN-PROGRESS, NEXT-OLDS
 - 2a. SHARE-CONTROL since IMS 6.1 includes RECOVERY-CONTROL functions of earlier releases
 - can assist in database integrity and recovery
 - Database "registration" by database data set
 - Monitors Database Image Copies (ICs), Change Accumulations (CAs), Recoveries (DBRs)
 - Automatic JCL generation of needed job-streams
 - 2b. SHARE-CONTROL enables database sharing:
 - Access-intent must be registered with a "share-level"
 - Database-level sharing
 - Intra- or inter-processor block-level sharing
- There is no DBRC or IMS "parm" that determines Log-Control vs. Share Control
 - Share Control is in effect for individual databases once they are "registered"

DBRC Database "Registration" for Share Control

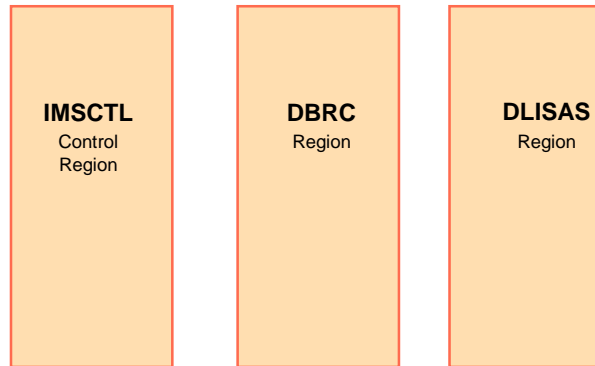
- Advantages:
 - Records recovery-related information in RECON
 - Example: which OLDS has log data for each database data set (DBDS) registered with DBRC
 - Controls recovery of databases
 - Generates JCL for recovery-related utilities
 - Used to select correct data sets to be used by Recovery and Image-Copy
 - Consolidates changes of log records
 - Saves time
 - Eliminates errors
- Register databases with DBRC commands
 - once a database is registered, Share Control is in effect

DLISAS (DLI Separate Address Space)



- DLISAS provides access to Full Function and HALDB data bases
 - Access to Fast Path Databases is done via the IMS Control region
- **Not started** in a DCCTL environment

System Address Spaces



- No Application programs execute in these address spaces
- After the 3 address spaces are started, we get the following message
 - [DFS810A IMS READY](#)
- After that we specify the type of restart we want to do:
 - COLD Start or WARM start or EMERGENCY Restart
- After the start process completes, we get the following message:
 - [DFS994I - xxxx start complete](#)
- Now we are ready to start the dependent regions

IMS Dependent Regions

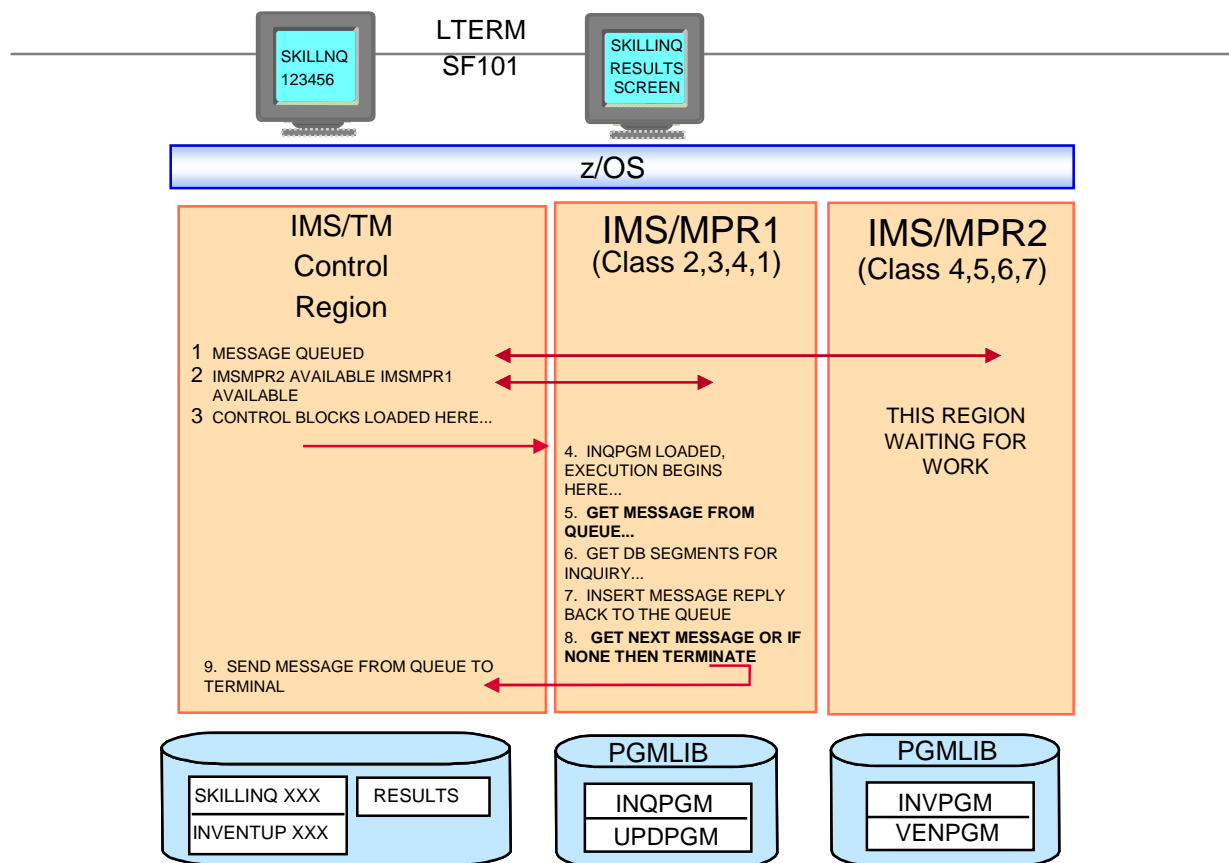
IMS Dependent Regions

- Regions in which application programs run
- These Regions are “dependent” on IMS Control region, DBRC & DLISAS for certain processing
- IMS Dependent Regions:
 - MPR
 - BMP
 - IFP
 - JMP
 - JBP
- Maximum number of dependent regions (including CICS/DBCTL & ODBA threads) is 999
 - In IMS V13 this is increased to 4095

Message Processing Regions (MPRs)

- Regions where application programs process transactions
- MPRs are started & stopped by operations
- Programs running here are called Message Processing Programs (MPPs)
- Different programs run in these regions thru the course of the day.
 - Although can designate some as Wait for input (WFI)
- IMS Scheduler decides which transactions will be processed in an available MPR and the appropriate program is either loaded from PGMLIB or the program **might be preloaded** in the MPR
- Programs in MPRs can call Java programs
- Programs can also access DB2 for z/OS via ESAF

Message Processing Programs (MPPs)



MPRs – final thoughts

- Its not uncommon to start some number of MPRs when IMS starts up and if the IMS Queue (of transactions) grows to then start some more MPRs and if later the queue drops to then shut down some MPRs.
- Programs running in MPRs can call Java subroutines, but the first application program scheduled cannot be a Java program

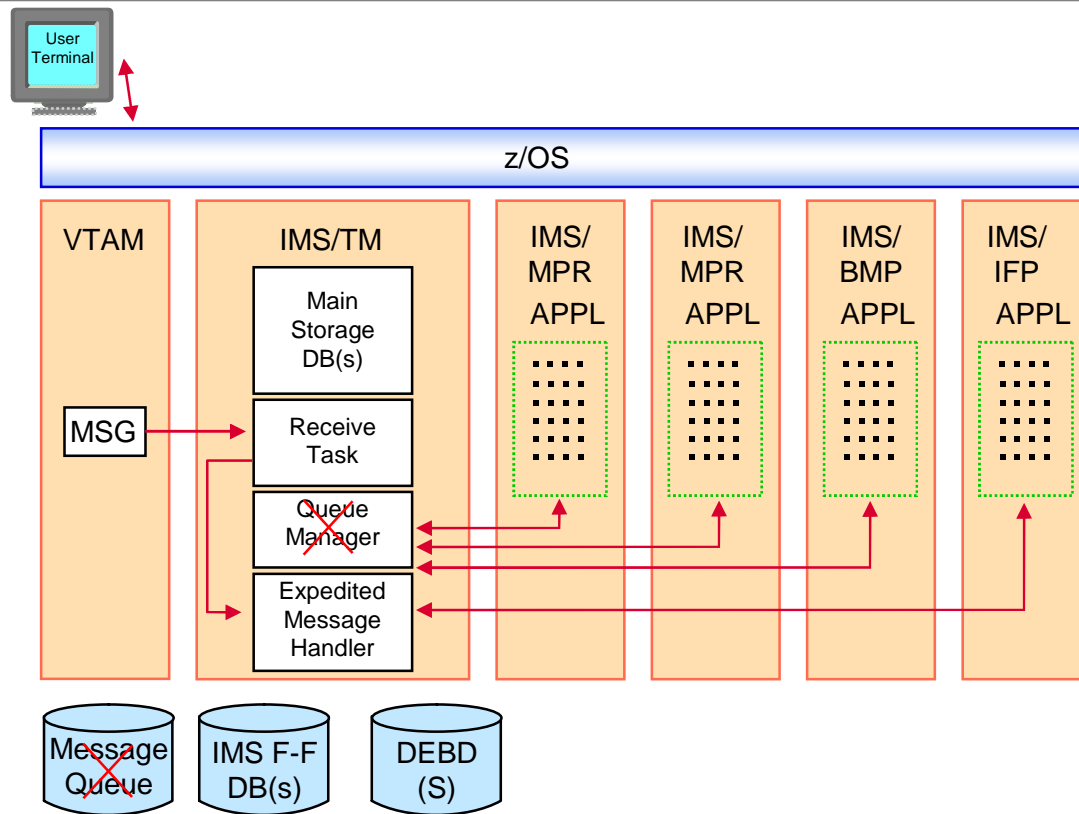
Fast Path

- Features designed to provide “faster” processing
- Databases:
 - Data Entry Databases (DEDBs)
 - Main Storage Databases (MSDBs)
- Fast Path databases can be accessed by programs in any region.
- Transactions: **Fast Path Exclusive transactions**
 - Processed in IFP regions

IFP (IMS Fast Path regions)

- IFP regions used for programs that process Fast Path Exclusive transactions.
- So What's a Fast Path Exclusive transactions?
- Transactions are designed to run Faster:
 - They do not go thru the IMS message queue
 - They are come into a dedicated buffer (EMH Buffer)
 - They are scheduled FIFO
 - They are single segment, response mode, non-conversational messages
 - Defined in the IMS SYSGEN as a Fast Path transactions
- Programs in IFP run as “Wait-For-Input” (WFI) ←===

Expedited Message Handler



Batch Message Processing (BMP) (1 of 3)

- Programs are "batch" programs – do long batch type processing
 - Submitted when ready by Operations
 - Region terminates when the program terminates ←==
- May or may not access the message queue:
 - 1. Message-driven BMP:
 - processes input messages and inserts output message reply: BMP address-space JCL parameters (IN= , OUT=)
 - 2. Non-Message driven BMP:
 - Cannot access IMS Input messages (transactions).
 - Can access:
 - databases,
 - z/OS datasets & GSAM files
 - Can insert IMS output messages

Batch Message Processing (BMP) (2 of 3)

- Message driven or non-message driven BMP specification done in IMS SYSGEN:

- Message driven:

```
APPLCTN  PSB=HQPGM,  
          PGMTYPE=(BATCH)
```

```
TRANSACT CODE=HQUPDT,  
          PRTY=(0)
```

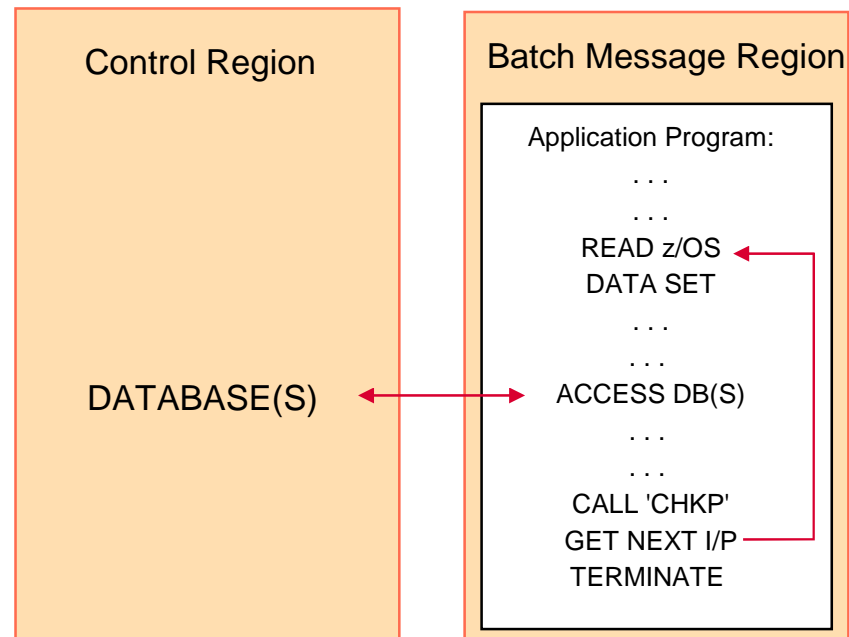
- Non-message driven:

```
APPLCTN  PSB=DB2PGM,  
          PGMTYPE=(BATCH)
```

Batch Message Processing (BMP) (3 of 3)

- Non-Message-Driven BMP

```
// EXEC PGM=DFSRRRC00, PARM='BMP,PGMNAME,PSB,...'
```

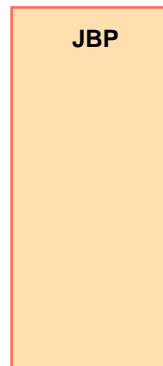


JMP (Java Message Processing regions)



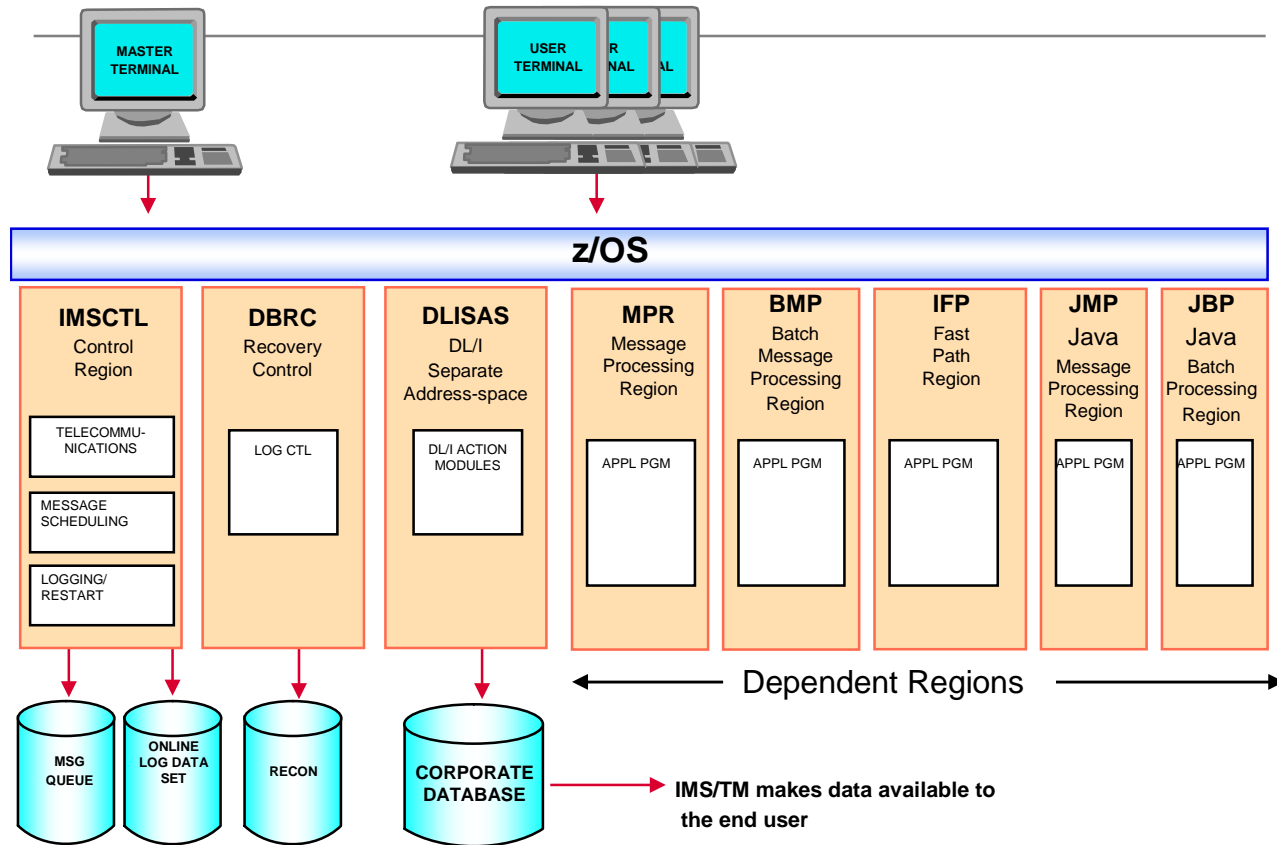
- Like MPR but with the following restrictions:
 - Allow scheduling of only Java applications
 - Java programs can call non-java subroutines
 - Cannot Preload applications like MPRs
 - Cannot use External Subsystem Attach Facility (ESAF)
 - This restriction removed in IMS V13

JBP (Java Batch Processing regions)



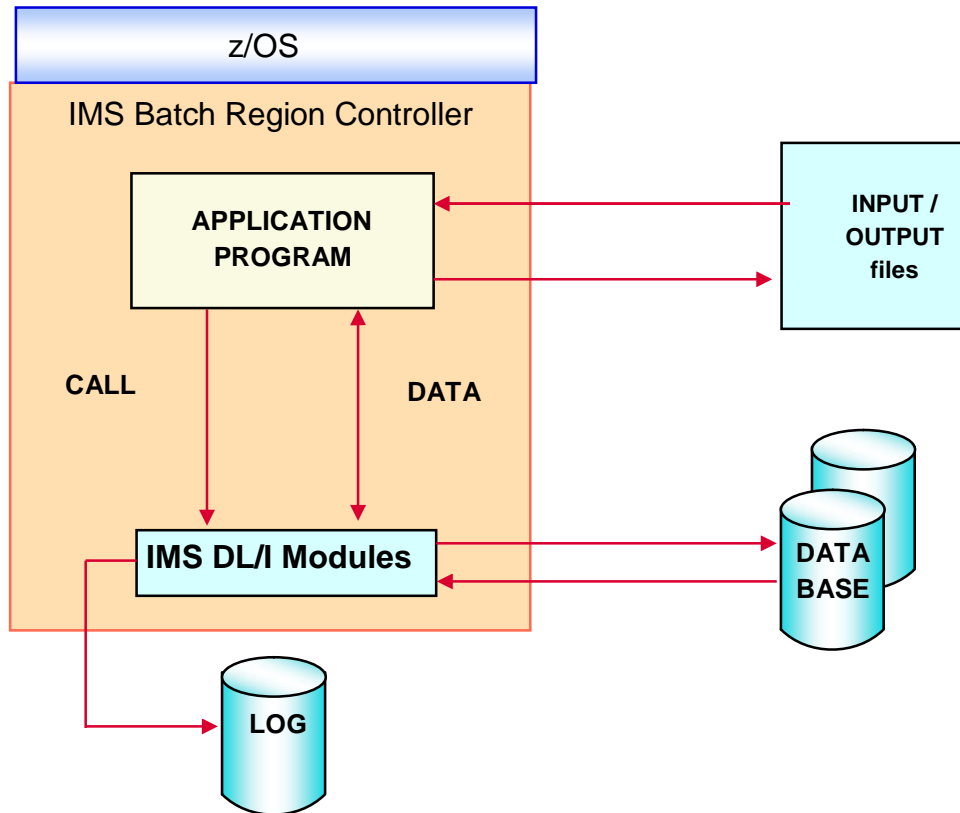
- Like a non-message driven BMP region but with the following restrictions:
 - Allow scheduling of only Java applications
 - Cannot use External Subsystem Attach Facility (ESAF)
 - This restriction removed in IMS V13

IMS Online Architecture



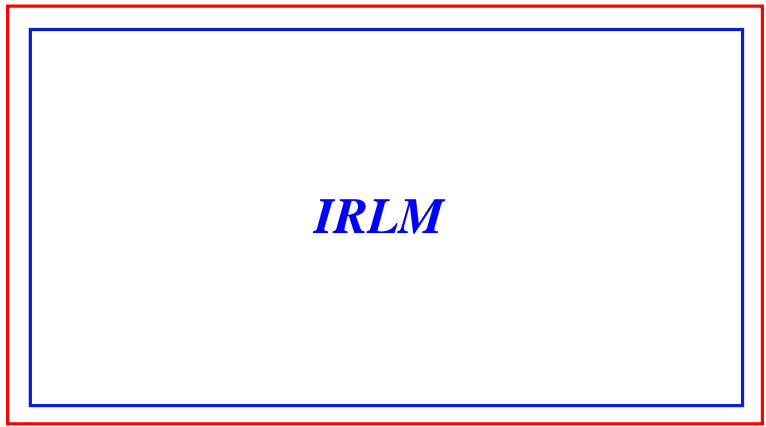
IMS DL/I Batch regions

DL/I Batch Region Processing



DL/I Batch Regions

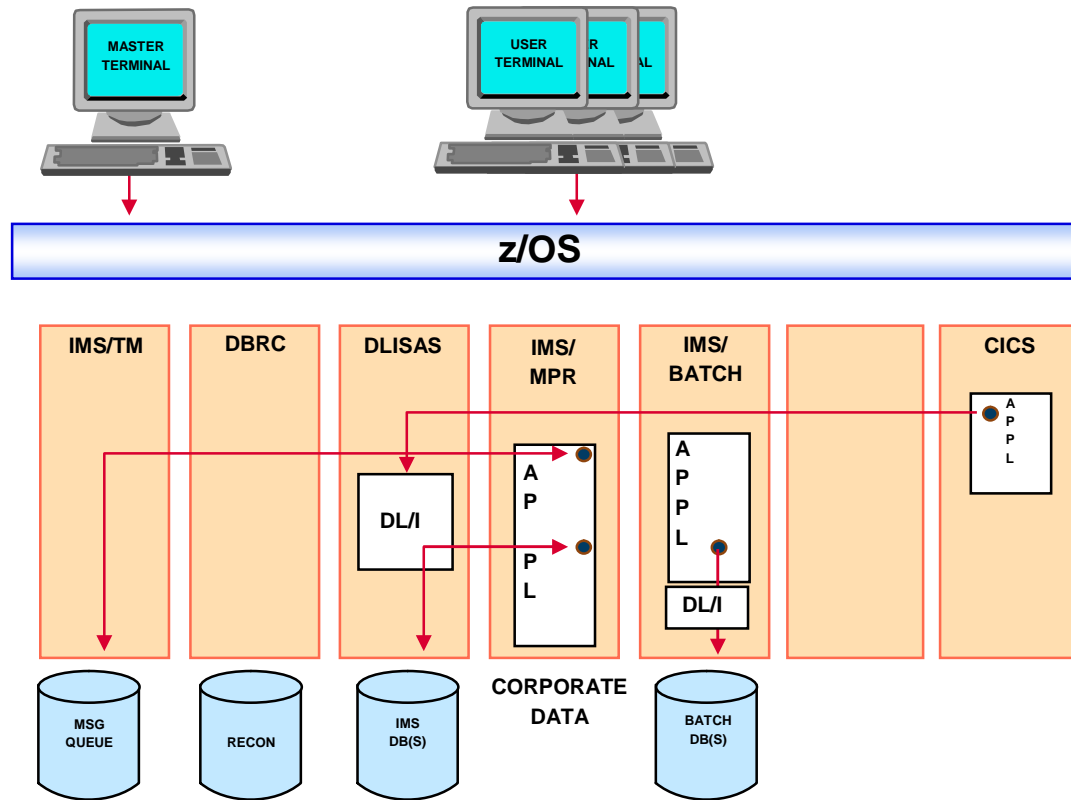
- Do long “Batch” processing
- Started by Operations by submitting JCL
- Each Batch region is a single address space
- Has its own log dataset
- Historically run at the end of day after online is brought down



IRLM (Internal Resource Lock Manager)

- Lock Manager (alternative to our other lock Manager PI)
- Must be used if you are doing block-level or Sysplex Data Sharing
 - Optionally could be used instead of PI in a non data sharing environment
- Runs in its own address space
- If used, it must be started before the IMS control region is started
- IRLM is also the lock manger for DB2 for z/OS
 - But cannot use the same IRLM address space for IMS and DB2 for z/OS

Data Sharing Definition



*Other IMS Address spaces
Covered in Part 2*

Other IMS Address spaces – Part 2

- IMS Connect – our TCP/IP Gateway
- Common Queue Server – for managing objects on a coupling facility
- Common Service layer address spaces:
 - OM
 - RM
 - SCI
 - ODBM
- IMS Repository Server Address space
- We will cover the above address spaces in Part 2

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