B07

An Overview of IMS V7

Greg Vance
gvance@us.ibm.com

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Abstract

IMS, the recognized leader in database and transaction management, continues to evolve. IMS may be used to power e-business environments while preserving customers' investments in mission-critical applications and data.

IMS Version 7 introduces many enhancements to help its users provide increased availability, improved performance, and a more usable system.

This session provides a comprehensive overview of what IMS function has been provided with IMS Version 7, made generally available in October 2000. It goes over the new functions provided with IMS V7, including the IMS DB High Availability Large Database support, Open Database Access (ODBA) which provides for IMS database access from DB2 stored procedures, DBRC usability and performance enhancements, and the IMS TM Rapid Network Reconnect, as well as numerous additional enhancements. This presentation lays the foundation for the more detailed electives on these enhancements.

This presentation will be of interest to both IMS TM and DBCTL users.

IMS Version 7

Availability

OPEN for BUSINESS

Performance

e-business

Usability

IBM
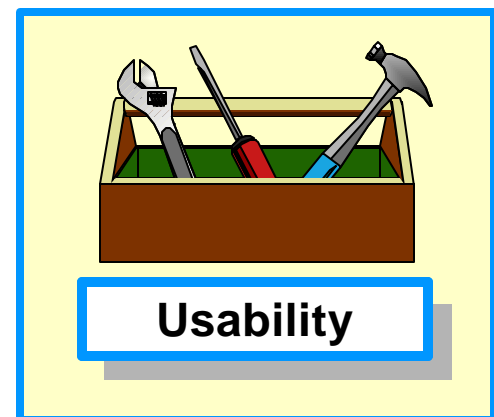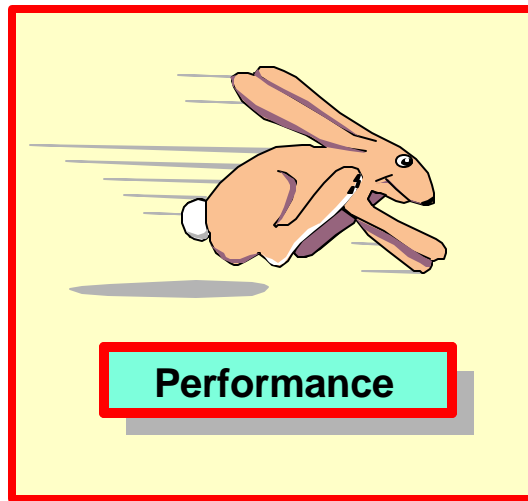
IMS Version 7

⚐ System Enhancements

- ► Install/IVP process
- ► System Parameters display
- ► CPLOG specification
- ► Concurrent upgrade of RECONs
- ► Online RECON access preference
- ► RECON loss notification
- ► ACBGEN processing and limits
- ► IMS Monitor and IMS PA enhancements

⚐ Database Enhancements

- ► High Availability Large DB (HALDB)
- ► Online Recovery Service (ORS)
- ► Change Accum enhancements
- ► Image Copy 2 compression
- ► DBRC GENMAX and RECOVPD
- ► DBRC PROCOPT=L|LS support
- ► I/O error handling for DEDBs
- ► DEDB Scan segment expansion
- ► Open DB Access (ODBA)
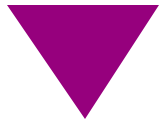
IMS Version 7

## ⚠ Transaction Manager Enhancements

- ► CQS Enhancements for Shared Queues
- ► Asynchronous OTMA/APPC
- ► TM and MSC Message Routing and Control User Exit
- ► Deferred VTAM ACB open
- ► RACF PassTicket support
- ► USERID clarification
- ► SLUP/Finance Session Cold Termination
- ► Spool enhancement

- ► Queue Space Notification Exit enhancement
- ► SLU2 enhancement
- ► ETO Enhancements
- ► Callable Interface to OTMA
- ► VTAM Generic Resources enhancements
- ► Rapid Network Reconnect (RNR)
- ► IMS Connect

⚠ e-Business

- ► IMS Connect
- ► Java support
- ► XML

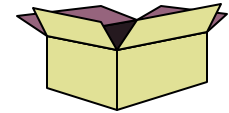## ⚠ Post GA enhancments

- ► See session B05
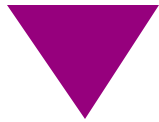
Install/IVP Enhancements

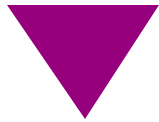**△ Style and format of Install/IVP panels standardized**

- Same look and feel as other IBM products
  - ▶ Action Bar Pull-Downs
  - ▶ Pop-up windows
  - ▶ Standard command and message areas

△ Sample IVP jobs support DFSMS allocation parameters
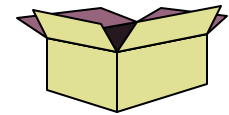 - ▶ STORCLAS
  - ▶ MGMTCLAS

Usability

Install/IVP Enhancements

△ **OS/390 Standards**

- Data set names
  - ▶ Distribution libraries: ADFS prefix
  - ▶ Target libraries: SDFS prefix

- Macro libraries
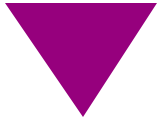 - ▶ One distribution library: ADFSMAC
  - ▶ One target library: SDFSMAC

△ **SYSGEN reduction**

- More than 1000 modules moved from SYSGEN to DFSJCLIN

Usability

System Parameters Enhancements

▲ **System parameters display**

- Written to system console and job log at initialization

▲ **IMS V6 CPLOG**

- CPLOG (system checkpoint frequency) set by system definition
  - ‣ Change requires a new system definition
- Default is 1000

> **Usability**

▲ **IMS V7 CPLOG**

- CPLOG default is 500,000
  - ‣ Reasonable default
- CPLOG is execution parameter in DFSPBxxx
- CPLOG may be displayed with /DIS CPLOG command
- CPLOG may be altered by /CHANGE CPLOG command
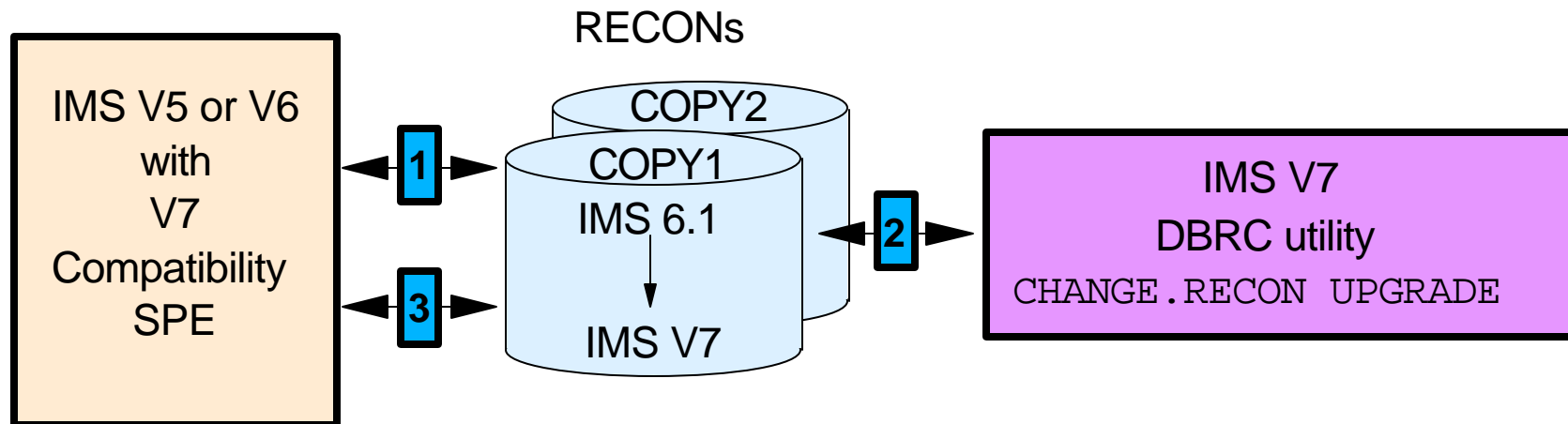 - ‣ Easily changed
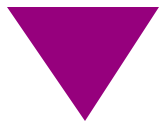
Concurrent Upgrade of RECONs

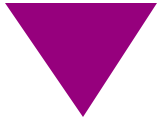⚠ **IMS 6.1 RECONs are upgraded to V7 without stopping IMS**

- Upgraded by DBRC command

  ▸ `CHANGE.RECON UPGRADE`

Availability

RECONs

IMS V5 or V6 with V7 Compatibility SPE		COPY2
	1	COPY1
		IMS 6.1
		↓
	3	IMS V7

IMS V7
DBRC utility
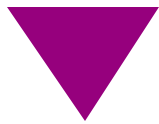`CHANGE.RECON UPGRADE`

2

Online RECON Access Preference

⚠ **Reserves of RECONs by batch jobs will be serialized**

- Only one batch job per MVS will request a RESERVE at any time

    ▸ Batch jobs will request exclusive enqueue before issuing RESERVE

    ▸ Utilities are included in "batch" jobs

⚠ **Avoids batch jobs locking out online systems from RECONs**

Performance

Other DBRC Enhancements

RECON Loss Notification

- Loss of RECON requires **all** IMS subsystems to reconfigure
- Message identifies all subsystems using RECONs
- Allows automation to force reconfiguration

Availability

Large RECON record warning

- Additional warning messages when records become large
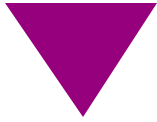- Provides more options to specify thresholds

Availability

Usability

DBRC Serviceability

- LIST.DBDSGRP member filtering
- LIST.HISTORY 'graphical' timeline

Usability

ACBGEN Enhancements

New PSB Limits

- Maximum SENSEGs increased to 30,000
- Maximum PCBs increased to 2500
- Maximum PSB size increased to 4 Meg

Usability

Reduction of ACBGEN PSB rebuilds

- IMS V7 does not rebuild PSBs for many DBD changes such as:
  - Change of exit routine names
  - Change of exit routine parameters
  - Change in field names
- PSB rebuilds still required for some DBD changes such as:
  - Addition of exit routines
  - Changes in segment descriptions

Availability

Performance

IMS Monitor and IMS Performance Analyzer

⚠ **Tracing of Fast Path added by IMS Monitor**

  ■ DEDBs, MSDBs, EMH, and IFP regions

⚠ **IMS monitor subsetting added**

  ■ Limit tracing to a set of databases or regions

  ■ Limit tracing to a time interval

⚠ **IMS Performance Analyzer reports Fast Path activity**

  ■ IMS Monitor report program does not report Fast Path activity
    ► IMS Monitor report program is not being enhanced

⚠ **Benefits**

  ■ More complete performance information

  ■ More manageable reports

  ■ Less impact by monitor tracing

Usability

Performance

HALDB (High Availability Large Database)

Large Database

Up to 10,010 data sets per database!

Greater than 40 terabytes

- Databases are partitioned
  - ► Up to 1001 partitions per database
  - ► Partitions have up to 10 data set groups

High Availability Database

- Partition independence
  - ► Allocation, authorization, reorganization, and recovery are by partition

- Self healing pointers
  - ► Reorganization of partition <u>does not require</u> changes to secondary indexes or logically related databases which point to it
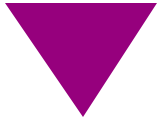
HALDB

⚠ **Database candidates for HALDB**

- Very large databases
  - ► Approaching 4G (VSAM) or 8G (OSAM) limitations
  - ► Theoretical limit is now over 40 terabytes

- Medium and large databases
  - ► Parallel processing to meet time deadlines

- Any size database
  - ► More frequent reorganizations
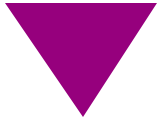 - ► Making only parts of the data unavailable for database maintenance

Online Recovery Service (ORS)

Online recovery of databases

- Logs are read once for all database data sets

- Parallel reads of inputs
  - Image copies, change accumulations, and logs

- Parallel writes of outputs
  - Databases recovered in parallel

- Change accumulation not required for data sharing

- Time stamp recovery to any time

A separate IMS Tool

Change Accumulation Enhancements
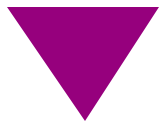
▲ **Data sharing limits merging of logs in IMS V6**

- Cannot merge incomplete log set
  - ▸ Merging requires /DBRs or termination of all IMS systems
  - ▸ "Spills" unmergable logs

▲ **IMS V7 eliminates this restriction**

- Merges all records up to end of oldest log
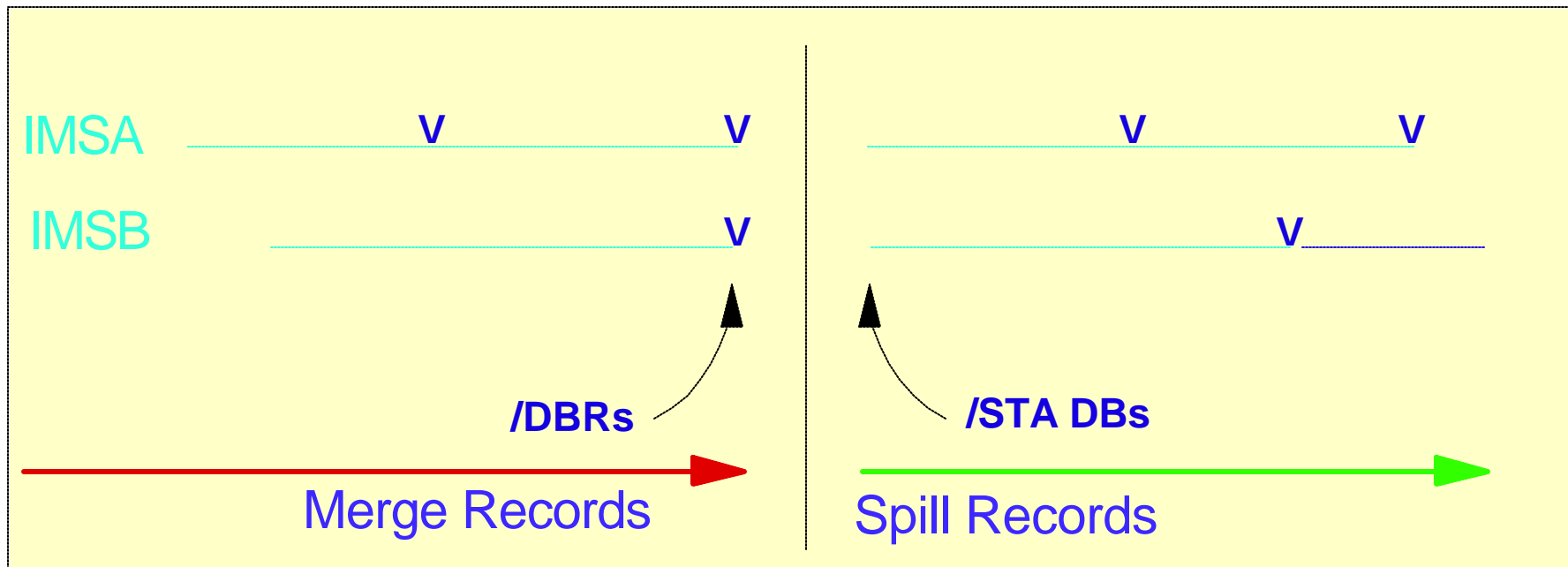- "Spills" only later timed records

Usability

Availability

IMS V6 Change Accum Illustration

⚠ /DBRs are used so that CA may merge records

IMSA _____ V _____ V   _____ V _____ V

IMSB _____ V   _____ V_____

/DBRs ↗   /STA DBs ↖

→ Merge Records   → Spill Records

V: end of volume

——— : log is input to Change Accumulation

------- : log is not input to Change Accumulation

IMS V7 Change Accum Illustration

⚠ **/DBRs are not needed**

- Fewer spill records are created

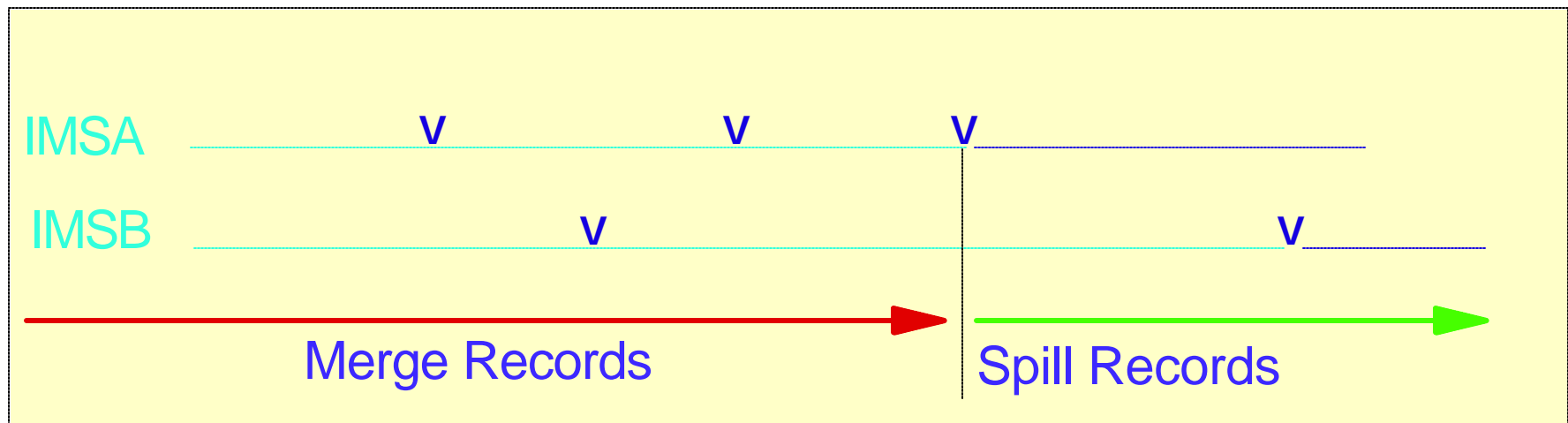IMSA   V   V   V

IMSB   V   V

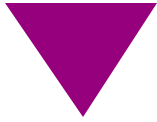→ Merge Records   → Spill Records

V: end of volume

——— : log is input to Change Accumulation

------- : log is not input to Change Accumulation

Change Accumulation Enhancements

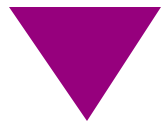⚠ **Sort efficiency automation**

- Automatically calculates sort key length

- Simplifies user interface

    ▸ User does not specify size

    ▸ Value in "ID" statement is ignored

- Avoids unnecessarily large sizes

    ▸ Large sizes have negative performance effect

Usability

Performance

Image Copy 2 Enhancement

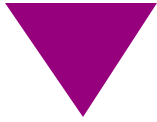⚠ **Compression may be used for Image Copy 2 copies**

- Invoked by control statement or GENJCL.IC keyword

- Invokes COMPRESS for DFSMSdss DUMP

- DFSMSdss RESTORE automatically expands data
  - ▸ RESTORE is invoked by IMS Database Recovery and ORS

⚠ **Benefits**

- Smaller space requirements

Performance

Availability

DBRC Enhancements

GENMAX and RECOVPD

- GENMAX no longer automatically increased to meet RECOVPD requirements
- Users no longer need to manually reset GENMAX

DBRC PROCOPT=L and LS support

- Image Copy Needed flag set
  - ▸ Prevents updates which cannot be recovered
- REORG record written for each database data set
- Prevents recovery using IC before initial load

DEDB I/O Error Handling
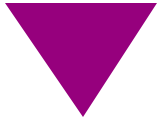
⚠ **New way of handling write errors for DEDBs**

- Write error CIs kept in memory

- Write error CIs may be read from memory

- Area not stopped after write errors for 10 CIs

⚠ **Benefits**

- Increased CI availability

- Increased area availability

- Processing similar to full function
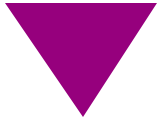
Availability

SDEP SCAN Expansion of Compressed Data

⚠ **SDEPs may be compressed with segment edit/compression exit**

- Previous releases did not include SCAN utility support for segment edit/compression exit

- Users could expand during scan process by using Scan exit routine

  ► Different exit routine or different coding required for each compression routine

⚠ **IMS V7 eliminates need for Scan exit for expansion**

- Scan utility option to invoke exit

  ► Users may continue to use old techniques for compatibility
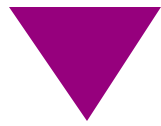
Usability

CQS Enhancements

△ **IMS V7 Enhancements**

- Support for multiple clients
  - ▶ Achieves better utilization of the CQS address space
    - Storage
    - Problem determination
    - Operations

- Security checking during CQS registration

- Interface enhancements
  - ▶ Diagnostics
  - ▶ CQS requests

Usability

Availability

Asynchronous APPC/OTMA

⚠ **Support for Asynchronous input message processing on a Shared Queues back-end system**

- APPC Asynchronous inbound requests (Allocate-Send-Deallocate)

- OTMA Commit-then-Send (commit mode 0)

- Note:
  - IMS/ESA V6 required all APPC/OTMA input messages to process on the Shared Queues front-end IMS system

  - Synchronous messages still process on the system in which they are received

Performance

Usability
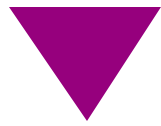
Asynchronous APPC/OTMA...

⚠ *Asynchronous* **OTMA/APPC input messages are allowed to process on any IMS system in the shared queues group**

▶ **Assumes** APPC/OTMA are enabled on all back-end systems

IMS2

IMS3

OTMA or
APPC
Client

Coupling Facility
(Shared Msg Queues)

IMS1

IMS4
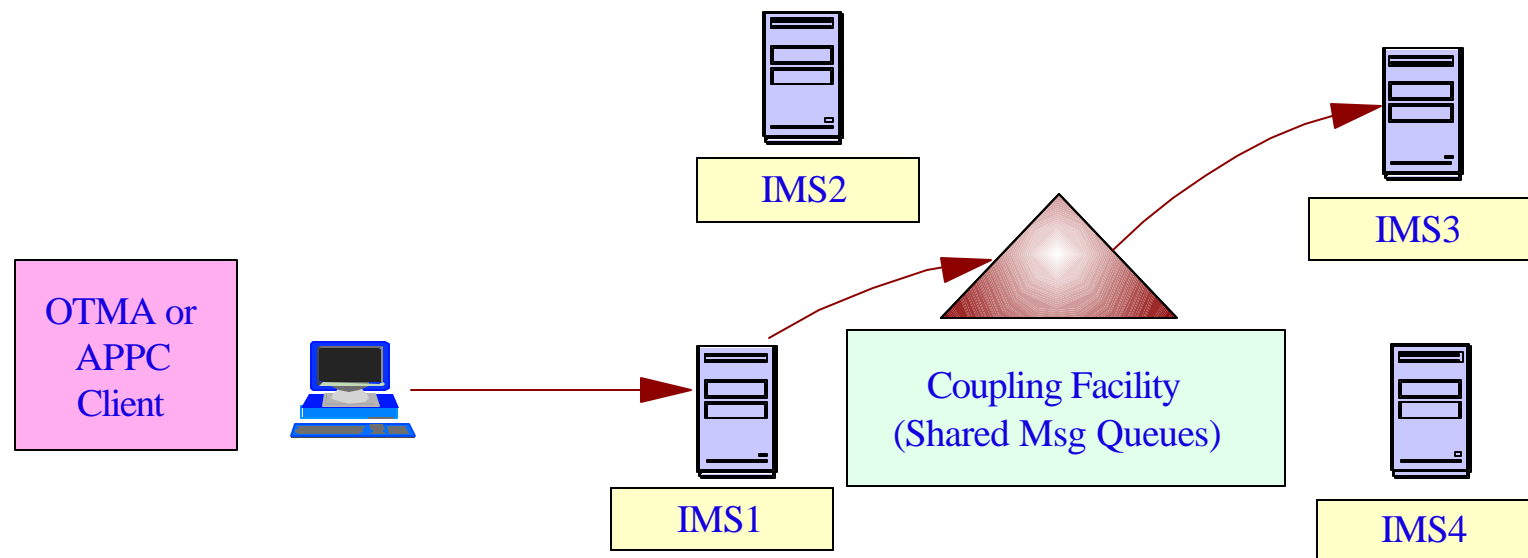
▶ IOPCB messages are delivered by the system which receives the input message

▶ ALTPCB messages are delivered by the system that processes the transaction

DFSMSCE0

TM and MSC Message Routing and Control User Exit (DFSMSCE0)

- New exit that combines and replaces:

  > **Usability**

  Terminal Routing Exit (DFSCMTR0)
  Input Message Routing Exit (DFSNPRT0)
  Link Receive Routing Exit routines (DFSCMLR0/DFSCMLR1)
  Program Routing Exit (DFSCMPR0)

  - ▶ Eases coding and maintenance by reducing the number of exit routines

  - ▶ Supports a consistent set of routing capabilities for all types of messages

- Provides the ability to attach a user prefix that follows the message and is passed to each exit interface

  - ▶ Allows the message to be customized for accounting, statistics, security, etc.

Queue Space Notification Exit Enhancement

⚠ **Enhancement to allow IMS to pass a stopped status to DFSQSPC0 for conversational destinations**

⚠ **Benefit**

- Prevent looping applications from impacting the message queue for stopped conversational destinations

- The exit has been available for many IMS releases and has had the ability to recognize stopped destinations but did not have the ability to provide this interface during conversational transaction processing
  - ▶ Application may receive "A7" status

Availability

Deferred ACB Open

△ **New system option to delay the opening of the VTAM ACB until IMS is ready to accept logons during /STA DC processing**

- **VACBOPN** = **INIT** | **DELAY**
  - ‣ Specified in the DFSDCxxx member of PROCLIB
  - ‣ INIT - Open ACB is issued during initialization (as before)
  - ‣ DELAY - Open ACB is delayed until /STA DC

- Prevents potential queuing of logon requests

  - ‣ Impacts devices (e.g., ATMs during ERE) that immediately send in logon requests when IMS begins initialization

Performance

Availability

Security Enhancements

△ **Enhanced PassTicket Support (uses RACF or equivalent)**

- New keyword parameter on the /SIGN ON command
  /SIGN ON userid PassTicket   APPL applname

- Provides greater flexibility for the end-user/program
  - ► PassTicket creation can use IMSID (same as before)
  - ► PassTicket creation can use the IMS application name

- Allows the creator of PassTickets to specify the value by which it knows IMS

△ **New system-wide default SAPPLID=applid in DFSDCxxx**

  - ► Enables the use of PassTickets for VGR connections to IMS

Usability

IBM

Security Enhancements

▲ **USERID Clarification**

- An indicator associated with the *userid* field that defines its content
  - ► USERID, PSB name, LTERM name, or other
  - ► Added to IOPCB, INQY ENVIRON call, and exit parameter lists
    - For example, DFSBSEX0 (Build Security Environment) exit

- Provides a method that allows IMS application programs and exits to determine whether a user was signed on at the time a transaction was entered

Usability

SPOOL Enhancements

⚠ **Internal change to the way EOF markers are written to spool data sets**

- Improves spool performance by reducing EOF writes from one per record to one per track.

  Performance

⚠ **A new IMSWT = yyyyy parameter in DFSDCxxx**

- Identifies the first 5 characters to use when auto scheduling the spool print utility

- Example:
  - ► IMSWT=IMSA causes IMS to issue: /STA REGION IMSA000 command to print the first spool line data
  - ► If IMSWT= is not coded, IMSWT is used as a default

- Facilitates the use of cloned IMS SYSGENs and PROCLIBs in a Parallel Sysplex environment

  Usability

- Each IMS generates correct spool print JCL

SLU2 Enhancement

⚠ **NEW DFSDCxxx option: SLU2=EXR/NOEXR**

- Specifies whether or not to suppress the SNA exception response to sending a DFS message during error recovery processing

- Addresses Program check/keyboard lock for SLU2 devices that implement DFT (Distributed Function Terminal) architecture
  - ► Applies to static and ETO terminals

> **Usability**
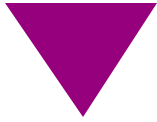
SLUP/Finance Session Cold Termination

⚠ **Extension to the /CHANGE NODE command for SLUP/Finance**

/CHANGE NODE nodename|nodename*|ALL COLDSESS

⚠ **New keyword COLDSESS**

- Resets status to 'COLD'

- Impacts devices that are not in session and are idle

- Allows a forced reset of terminals via command if an unrecoverable STSN sequence number mismatch occurs during system warm start

- Allows applicable ETO control blocks to be cleaned up at next system checkpoint

Availability

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ETO Enhancements

⚠ **Descriptor Limitation (50 records/descriptor) has been removed**

⚠ **Associated Print Support Enhancements**

- Allows more timely delivery of output messages for Associated Printers regardless of where the transaction is processed in a Shared Queues environment
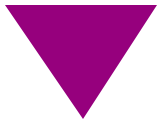
⚠ **Autologon**

- Enhancements for Associated Printers, Dynamic terminal activated via /OPNDST

- New Keywords in the /CHANGE command
  - ► Update autologon information, e.g., Mode
  - ► SAVE|NOSAVE across restarts

> **Usability**

⚠ **LTERM Assignment**

- Allows users and LTERMS to be moved between printers more easily
  - ► Assignments can persist across session and system restarts

Rapid Network Reconnect (RNR)

RNR implements VTAM persistent session support   Availability

- Higher availability and reduced overhead
  - ▸ Quickly reestablishes VTAM sessions following system outages (IMS, MVS, CEC or VTAM)
- Eliminates session cleanup/restart following an outage

New IMS option PSTIMER

- Specifies time VTAM waits for recovery of the persistent session before terminating sessions

New IMS option RNR = NRNR | ARNR

- ▸ ARNR - automatic session reconnect
- ▸ NRNR - no reconnect

RNR - VTAM Persistent Sessions

▲ **VTAM Single Node Persistent Session (SNPS)**

  ■ Reconnect must be on same CEC as original IMS

  ■ Supports only application (IMS) failure/reconnect
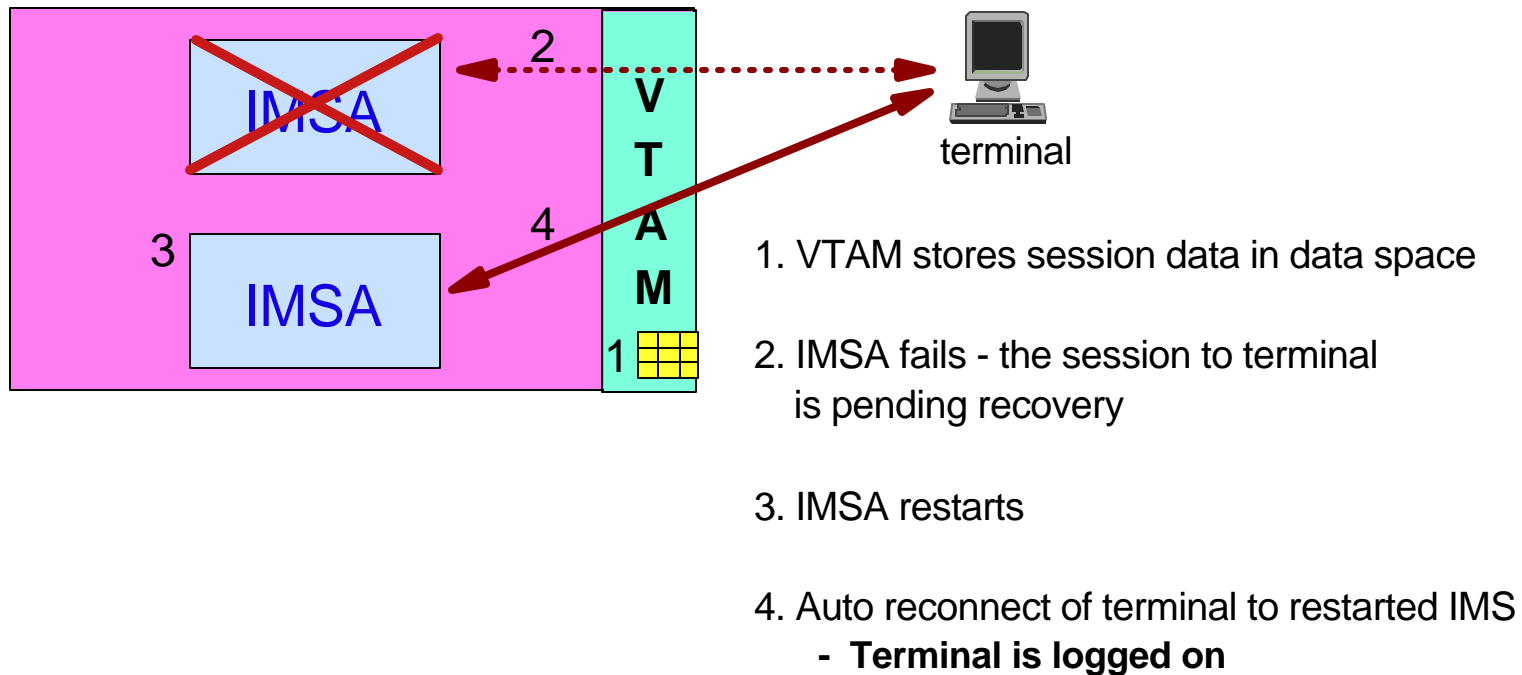
▲ **VTAM Multinode Persistent Session (MNPS)**

  ■ Reconnect may be on another CEC in a sysplex

  ■ Supports failures/reconnects, including IMS, VTAM, MVS, and CEC failures

▲ **Persistent sessions apply to VTAM nodes except MSC**

  ■ Persistent session support for APPC is provided by APPC/MVS

RNR - Single Node Persistent Sessions

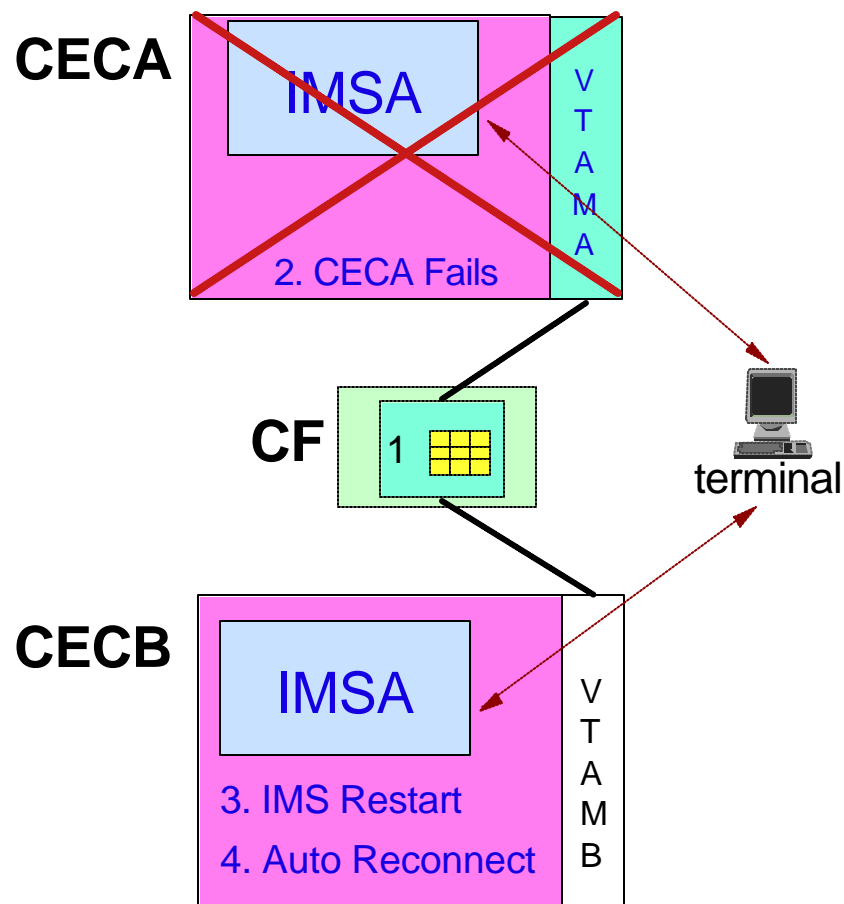▲ **Single Node Persistent Session scenario**

1. VTAM stores session data in data space

2. IMSA fails - the session to terminal is pending recovery

3. IMSA restarts

4. Auto reconnect of terminal to restarted IMS
   - **Terminal is logged on**

RNR - Multinode Persistent Sessions

△ **Multinode Persistent Session scenario**

CECA

IMSA

V T A M A

2. CECA Fails

CF 1

CECB

IMSA

3. IMS Restart

4. Auto Reconnect

V T A M B

terminal

1. VTAM stores session data in the CF

2. CECA fails
   - Another VTAM in the Parallel sysplex
     detects the error

3. IMSA is restarted on CECB

4. The sessions are restarted using
   information saved in the CF structure
   - **Terminal logged on**

IBM.

RNR Benefits

⚠ **Session termination and establishment traffic eliminated**

- Session information is maintained

⚠ **Terminal service to <u>same IMS</u> is reestablished more quickly**

- Terminal users are "hung" until restart completes
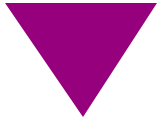
⚠ **Value of RNR depends on how quickly IMS is restarted**

IMS Java

z/OS

IMS Application Programs

JAVA

COBOL

Assembler

C

PL/1

IMS
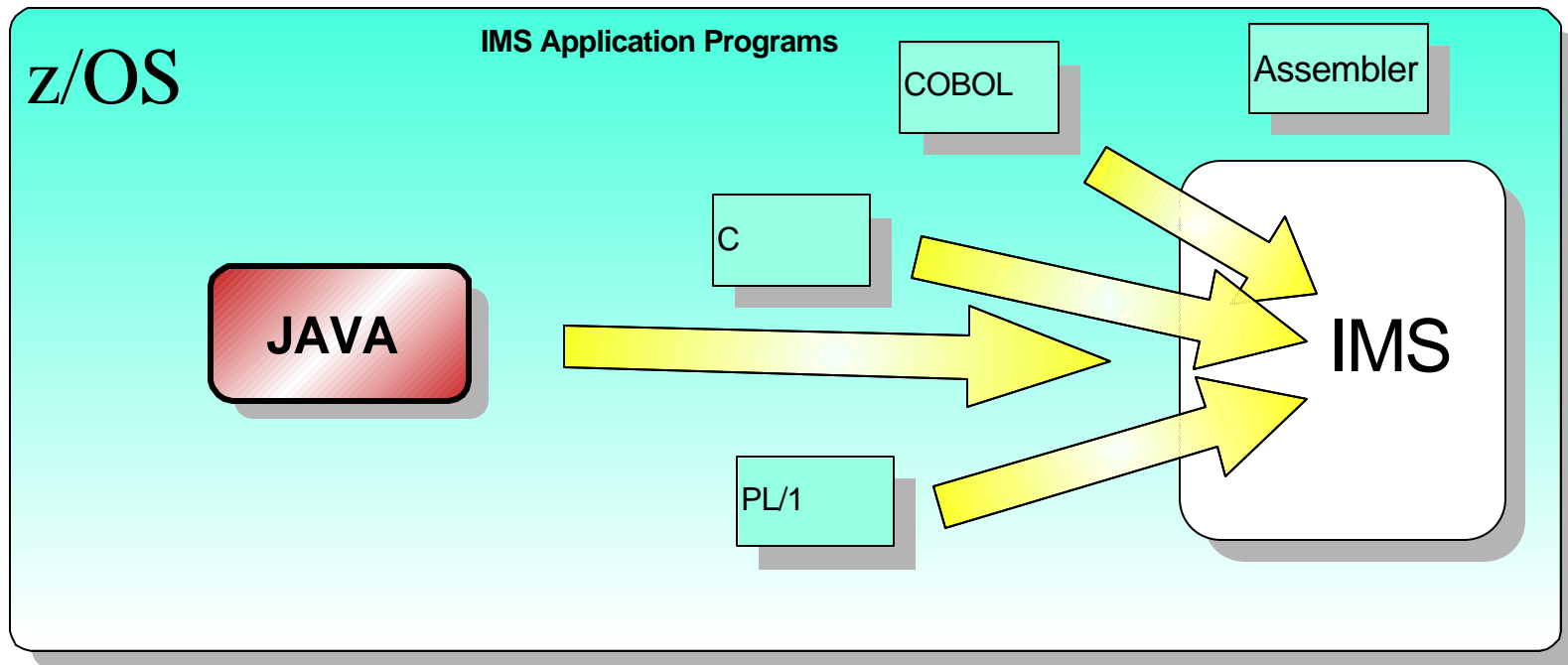
⚠ **New function of IMS V7**

⚠ **Capability to write, compile and run IMS Java programs**

- Run as MPPs, BMPs, IFPs

IBM

IMS Java (cont.)

⚠ **Development environment**

- Provides a set of packages (groups of classes)
  - ► Allow access to IMS services
  - ► Support APIs familiar to Java programmers

- Uses the S/390 HPJ (high performance Java) compiler

- JDBC to access IMS DB and DB2 data

- Uses VisaualAge tools for development

⚠ **Benefits**

- Incorporation of the Java programming model into the IMS environment

- Application programmer productivity

- Available skills

IMS Connect

⚠ **New separately-priced/orderable tool for IMS**

- can be used with IMS V6 or V7

⚠ **Highlights**

- SMP installability

- Persistent TCP/IP sockets and bottleneck relief for improved performance

- User exit, command improvement, and asynchronous output for enhanced usability

- Dump and Trace formatting for increased serviceability

- Linux support

- Unicode support (IMS V7 only)

- Local support, without TCP/IP, when communicating from a webserving application to IMS in a S/390 environment (IMS V7 only)
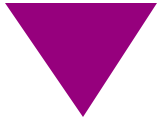
⚠ **Prerequisite**

- IMS V6/7 Transaction Manager

Usability

Performance

Availability

IMS Connector for Java

Helping IMS Users make the transition to e-business easier

- **Create Java applications or servlets that can access IMS transactions**

- **Provides Java bean classes to aid in composing applications using the VisualAge for Java Command Editor**

- **Ships with *Visual Age for Java Enterprise Edition* as one of the IBM e-business Connectors**
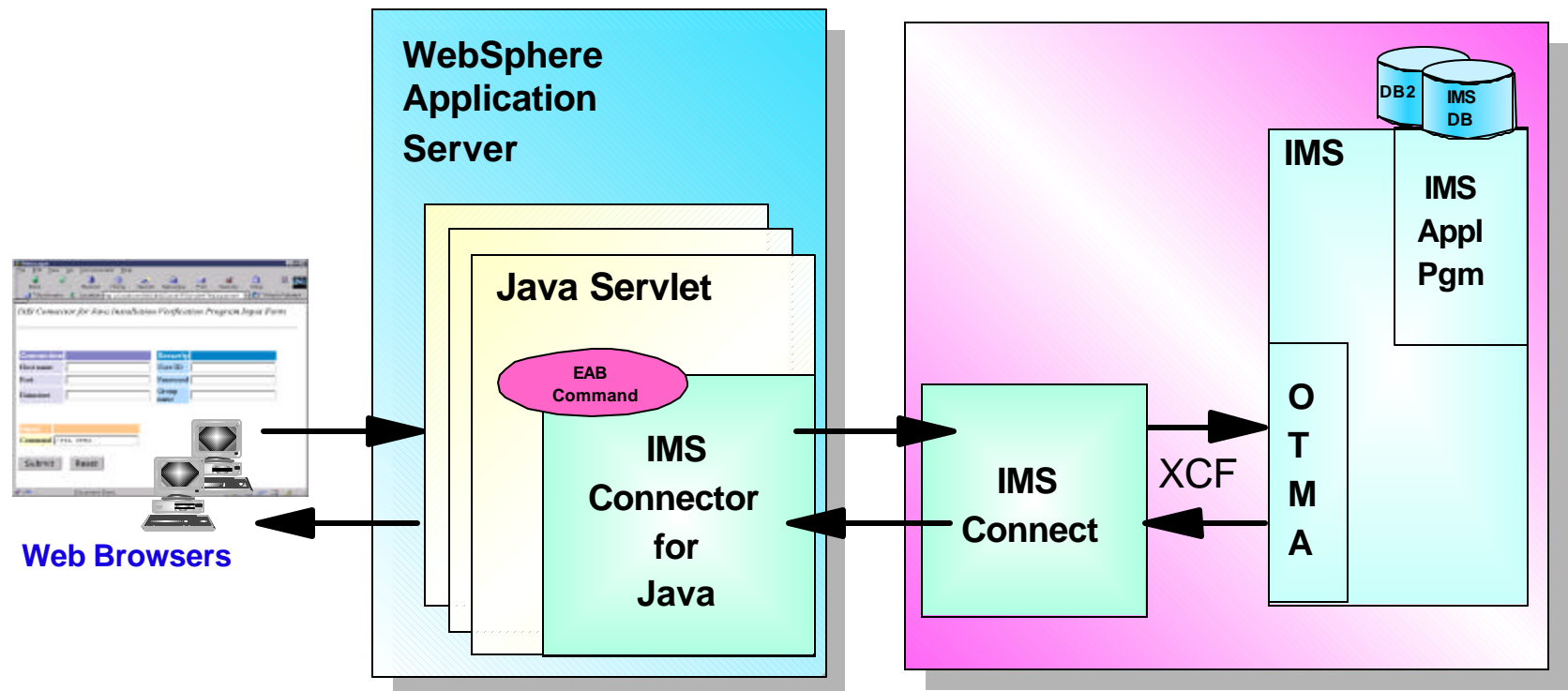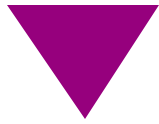
IMS Supports XML Today!

- **MQSeries Integrator**

  - **Bridging XML and existing IMS applications**
    - Dictionary support for messages
    - Routing and processing based on message content

- **IMS C++ or IMS Java programs in V7**

  - **IMS users can write applications which use the XML toolkit for OS/390**
    - IMS transaction code still must be EBCDIC - rest of data can be tagged (XML)
    - Java/C++ program can invoke XML parser to convert to non-tagged data

Other Enhancements
Also available in IMS V6

- **I/O Performance Enhancements**
  - Fiber Channel Connectivity (FICON) support for IMS database and Log
  - Enterprise Storage Server (ESS) support
- **VTAM Generic Resources (VGR) enhancements**
  - VTAM, rather than IMS, manages affinities at session termination
  - new IMS execution options GRAFFIN=VTAM and GRESTAE=Y/N
  - also available in V6 as PQ18590
- **OTMA Callable Interface**
  - Provides access to IMS transactions and commands through the Open Transaction Manager Access (OTMA) interface
  - C and C++ API high level interface for OS/390 applications
  - also available in V6 as PQ17203
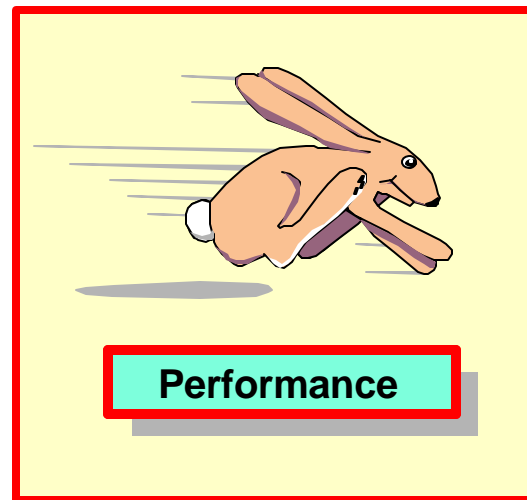- **ODBA - Open Database Access**
  - access to IMS DB outside of IMS TM or CICS
  - may be used with DB2 stored procedures
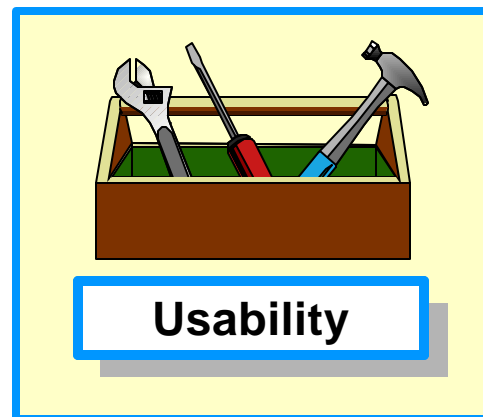 - also available in V6 as PQ15784

IMS Version 7

Availability

- HALDB
- ORS
- RNR
- VTAM Gen. Resources
- DBRC
- Change Accum
- IC2
- DEDB I/O error handling
- SLUP/Finance Session Cold Termination
- ...

Performance

- HALDB
- ORS
- DBRC
- Change Accum
- ACBGEN
- Async OTMA/APPC
- Deferred ACB Open
- ...

Usability

- HALDB
- ORS
- ODBA
- Install/IVP
- IMS Connect
- DBRC
- ACBGEN
- Change Accum
- RACF PassTicket
- ...