

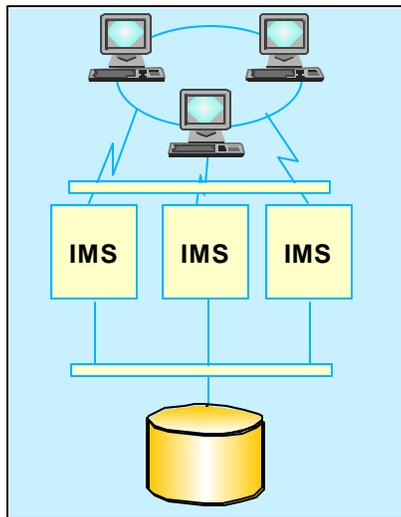
IMS Version 7 Presentation Guide



Version 7

- ▶ IBM is enhancing the IMS Database Manager (IMS DB) and IMS Transaction Manager (IMS TM) with IMS Version 7, that enables you to shape how you:
 - ▶ Transform the way you do business
 - ▶ Build e-business applications that tolerate the rigors of doing business on the net
 - ▶ Run a scalable, available, safe environment
 - ▶ Leverage everything you learn in the process, and mine all your information to make better decisions.
- ▶ IMS TM continues with IMS V7 as IBM's premier Transaction Server for environments that employ relational and hierarchical data stores and which require the utmost in integrity, capacity, availability, and performance for e-business and Enterprise Computing environments.
- ▶ IMS DB is IBM's premier hierarchical database server. It continues to provide and enhance high performance/capacity, superior integrity, continuously available database management solutions for IMS TM and CICS.

IMS Version 7



● Major Enhancements

- High Availability Large Database (HALDB)
- IMS Java
- Rapid Network Reconnect
- IMS Monitor changes for Full Function and Fast Path
- Online Recovery Service Facility
- IMS Connect Facility

● Benefits

- Performance/Capacity
- Increased availability
- e-business enablement
- Preserve current application investments
- Enabling new applications

IMS Strategy is to enable e-business solutions

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IMS V7 Overview 8/00

IMS V7 provides major enhancements to the IMS Database Manager and the IMS Transaction Manager, and. There are also two new, separately priced facilities for use with IMS V7 -- IMS Online Recovery Service and IMS Connect.

HALDB, High Availability Large Database, provides partitioning of full function DL/I databases and removes the existing constraints on the size of a single database. Not only is the database capacity extended, but major benefits include the increased availability and independence of each partition in the database because each partition can be managed and taken off-line while the other partitions remain active.

IMS Java support provides application development and execution in IMS of Java applications accessing IMS DB and DB2 databases.

Rapid Network Reconnect allows IMS TM to automatically reconnect terminal sessions following any kind of IMS failure and subsequent restart. In a Sysplex environment, the network reconnect (logon) time after IMS restart is reduced.

The IMS Monitor adds support for Fast Path resources.

In addition, for both full function and Fast Path databases, new constraints (limitations) on what is monitored can be specified.

IMS Connect is a new facility for IMS, incorporates the functions of the IMS TCP/IP OTMA Connector (TOC) with additional installability, usability and serviceability enhancements.

IMS Online Recovery Service, a new facility for IMS V7 provides database recovery in an online environment and point-in-time recovery. A new operator command, /RECOVER initiates the recovery process. IMS performs the recovery process for multiple databases in parallel, with a single pass of reading the log, providing improved recovery time and greater efficiency in processing the log and recovery input.

IMS V7 also contains many other enhancements which address specific user requirements. These are summarized in the next two charts.

The focus of IMS V7 is on the enhanced availability, performance, capacity, and systems management capabilities of the S/390 server which enables e-business solutions for enterprise computing.

IMS Version 7 Database Management Enhancements



Availability/Performance/Capacity Systems Management

- High Availability Large Database
- Online Recovery Service Facility
- Application Control Block Generation (ACBGEN) enhancements
- DBRC Enhancements
 - ▶ Recovery Control (RECON) online upgrade, online access, large record warning, loss notification, improved diagnostics
 - ▶ Image Copy Genmax and Recovery enhancement
 - ▶ DB administration enhancements
- Forward Recovery enhancements
 - ▶ Change accum spill record handling
- I/O Performance enhancements
 - ▶ Ficon support
 - ▶ ESS support
- 64 bit real support
- CSA Constraint relief
- Installation enhancements
- Logger enhancements
 - ▶ Administration and Control
- FP Enhancements
 - ▶ I/O toleration enhancements
 - ▶ Performance monitoring support
- IMS systems parameter display

IMS V7 Database Management enhancements include: Improved availability in database recovery and reorganization, increased performance in database size, and improved systems management in diagnostics and error handling. To name a few of these additional enhancements:

IMS Database Recovery Control (DBRC) enhancements improve diagnostics information, improve Database integrity protection, eliminate abends, provide large Recon record support, Recon loss notification, and migration/coexistence.

Storage relief is provided through the use of: 64-bit real support with above-the-bar 64-bit real storage used for IMS page-fixed storage, freeing up below-the-bar real storage, and Common Storage Area (CSA) constraint relief, providing more below-the-line 16M Common Storage Area usage is made available by moving modules and control blocks above the 16M line.

Logger enhancements are provided with more dynamic capability to change system checkpoint frequency which improves system management and availability. A number of other systems management enhancements to the logger are also provided.

The Installation and installation verification process (IVP) panels are changed to have the same look and feel as panels for other IBM products. Support is also provided for Data Facility Storage Management Facility (DFSMS) constructs and HALDB sample applications

Fast Path database enhancements are provided for Data Entry Database (DEDB) I/O Tolerant improving handling of write errors, as well as the addition of support for performance monitoring capabilities.

We will be talking about some of these in more detail later.

IMS Version 7 Transaction Management Enhancements



Application Development/Connectivity Availability/Performance/Capacity

- **IMS Java**
- **XML**
- **IMS Connect Facility**
- **OTMA Callable Interface**
- **ETO Enhancements**
 - ▶ Associated Printer support
 - ▶ Autologon enhancements
 - ▶ LTERM assignment

Systems Management/Usability

- **Sysplex Queue Sharing Enhanced**
 - ▶ CQS enhancements for Shared Queues
 - ▶ Asynch APPC/OTMA for Shared Queues
- **Routing Exit enhancements**
- **RACF Pass Ticket Support**
- **USERID clarification for applications**
- **External Storage Attach Facility (for DB2) Trace enhancements**
- **Installation enhancements**
- **IMS systems parameter display**

- **Rapid Network Reconnect**
- **Deferred VTAM ACB Open to prevent time-outs**
- **Improved checkpoint frequency control**
- **SLUP Finance Session Coldstart capability**
- **VTAM Generic Resources enhancement for VTAM to manage the affinity**
- **Queue Space Notification Exit**
- **I/O SPOOL usability and performance enhancements**
- **SLU2 exception response enhancement**

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IMS V7 Overview 8/00

The IMS V7 Transaction Manager is also providing many enhancements -- in the area of application development and connectivity, systems management, sysplex sharing, network load balancing, capacity and availability. To name a few of these additional enhancements:

Rapid Network Reconnect, utilizing the facilities of VTAMs Multinode Persistent Sessions, permits IMS TM to automatically reconnect terminal sessions following any kind of IMS failure and subsequent IMS restart, thereby reducing network reconnect time after IMS, MVS or VTAM failure in a sysplex environment. It provides fast terminal reconnect to IMS by eliminating terminal logons and VTAM session startup traffic. IMS restart is required after IMS failure.

Shared Queues and Fast Path sharing enhancements, utilizing the coupling facility, provide asynchronous APPC/OTMA (open transaction manager access facility) shared message queue enablement, additional client support (multiple clients and additional client information and control), enable user autologon for a printer when application output becomes available and performance and miscellaneous enhancements to shared Fast Path Expedited Message Handler (EMH) and Sequential Dependent Segments (SDEP's).

IMS is being made Tivoli ready and enhancements are being provided for management of IMS through the Tivoli Global Enterprise Manager, and the Tivoli Manager for OS/390.

IMS is also supporting XML through interoperation with the OS/390 XML Parser, Java edition.

We will be talking about some of these in more detail later.

IMS V7 Software Prerequisites and Migration SPEs



IMS V7 MINIMUM RELEASE LEVELS

- OS/390 V2R6 (5647-A01) with DFSMS 1.4
 - RACF (included in separately orderable e-Network Communications Server) or equivalent if security is used.
 - High Level Assembler Toolkit
- 64-bit real requires OS/390 V2 R10
- IMS Java requires VAJava for OS/390

– DBRC Migration/Coexistence SPE

- on IMS V5 (PQ27640)
- on IMS V6 (PQ27643)
- MSC Migration/Coexistence SPE
 - on IMS V5 (PQ27553)
 - on IMS V6 (PQ27555)

The minimum prerequisite software is show here with IMS V7 requiring OS/390 V2R6 with DFSMS 1.4 and some of the facilities offered in or with it: RACF (included in the separately orderable e-Network Communications Server) or its equivalent if security is used and the High Level Assembler Toolkit .

6r bit real support requires OS390 V2 R10

IMS Java support requires VAJava for OS/390

There are also being provided some migration/coexistence SPEs for IMS V5 and V6 through the service process.

IMS V7 Hardware Prerequisites



- OS/390 V2R6 hardware requirements
- IMS V6/V7 Shared Queues, Shared EMH Requirements (unchanged from IMS V6)
 - Coupling Facility with CFCC level 3 required, level 5 recommended.

● MADS I/O Timing
— requires Coupling Facility

● Rapid Network Recovery
— requires Coupling Facility

The hardware prerequisites for the Sysplex environment is that of the OS/390 V2R6 product. In addition, when the shared queues and shared EMH function, introduced in IMS V6, are used have not changed with IMS V7. Two of the new functions in IMS V7, MADS I/O Timing and Rapid Network Reconnect (Multinode persistent session option), require a Coupling Facility.

IMS Java for Integrated e-business Application Development



✓ Application programmer productivity

- Skills
 - Java access to IMS input/output message queues
 - JDBC to access IMS DB and DB2 data
- Tools
 - Uses VisualAge tools for development

- Also including in the base of IMS Version 7 is our IMS Java application support to enhance the ability of our customers and business partners to provide integrated e-business application development with IMS.
- The object of this function is to provide support for you to write Java applications and run them as IMS applications using Visual Age workstation and host tools for development and testing.
- Compiling will be provided through the High Performance Java compiler.
- We will be providing access to IMS TM message queues
- We will also be providing access to IMS DB and DB2 data through JDBC.

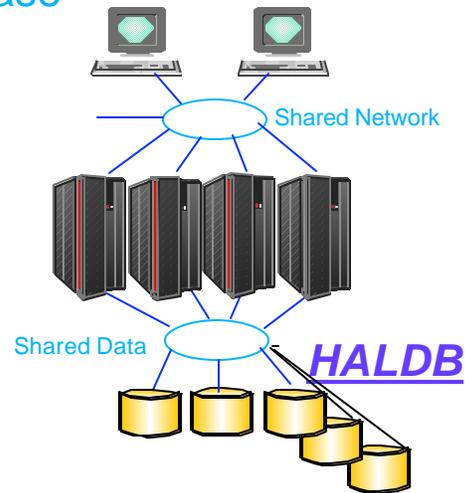
HALDB - the database for the 21st century



High Availability Large Database

● How Big? - Doing the Math

- 4 Gig (data set size) x 1001 (partitions) x 10 (datasets per partition) allowed by HALDB
- ~ 40 Tera Bytes
- over 20,000 3390 devices!
- over 6600 bytes for each person on earth!



High Availability Large Data Base Support allows for 1001 partitions to a max capacity of 40 gigabyte each. This means you can have over 40 Terabytes OSAM and VSAM databases. That would be 20,000 3390 devices. This works out to 6600 bytes for each person on earth. This compares to V5/6 when we just expanded to allow 8 gigabyte databases

This support also allows for a partition to be taken offline, have something done to it and be independently brought back online. This means each partition could be individually unloaded and reloaded and while offline a batch reorg could be done to on it. Or the entire database could be taken offline and each partition could be reorged in parallel, greatly speeding up the offline reorg process.

The Database sizes that are possible are enormous. Finding a large enough computer room to contain a 40 Terabyte database will probably be a challenge few customers will need to face.

User Requirements for IMS Full Function Databases



- **Capacity - current IMS DB databases are limited in size**
 - up to 10 datasets per DB
 - all occurrences of record type must fit in single data set
 - if single data set is full, DB is full
 - maximum data set size - 4 gigabytes for VSAM, 8 gigabytes for OSAM even record length
- **Availability**
 - Currently, an entire database must be made unavailable for processes such as reorganizations, batch image copies, and recoveries
 - Faster Recovery time
- **Manageability**
 - As its size grows, a database becomes difficult to manage
 - Smaller sections of the database are easier to manage
- **Usability**
 - The reorganization of a database is complicated by the need to run the prefix resolution and prefix update utilities

Long standing user requirements against IMS DB full function databases were current limitations prior to IMS V7. These requirements were for extending the capacity and availability of the data. They were also for ensuring the ease of management and use as the databases grow and needed reorganization.

HALDB - Highlights



- **Database records are grouped into partitions**
 - A single database consists of 1 or more partitions
 - Hierarchic structure is maintained within a partition
 - A partition is selected based on High Key or Partition Selection Exit
- **Partition independence is maintained**
 - Each partition can be managed independently -- commands, scheduling, utilities
- **V7 extends capacity significantly**
 - each partition can be size of non-partitioned DB
 - up to 10 Data Set Groups per partition
 - 1001 partitions maximum

An IMS Full Function database can now be divided into partitions, which are groupings of data base records that can be accessed by application programs based on an algorithm of High Key (all records which have a key less than the High Key define a partition) or via a user-created Partition Selection Exit. In this way, the database can be organized, accessed, and recovered by partition. All prior constraints on the size of the database are removed as a single partition can now be the size of a non-partitioned database and up to 1001 partitions can be defined for a single database.

HALDB - Benefits



- **High availability**
 - Partition independence for operator commands, reorganization, recovery, and scheduling
 - Parallel Partition processing
- **Larger capacity**
 - Each partition can be size of non-partitioned database
- **Manageability**
 - Smaller partitions are easier to manage
- **Usability**
 - Partition definition is via an ISPF Partition Definition Utility

Partitioning provides a number of benefits:

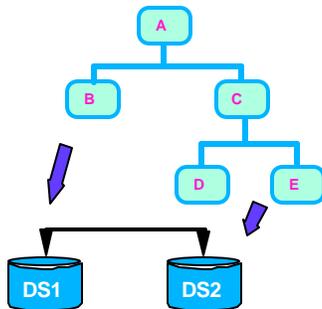
Database availability is greatly enhanced in that portions of the database can be taken off-line without affecting the other partitions of that database. Smaller partitions are easier to manage than one large database; each partition can be reorganized off-line in less time than if the entire database had to be reorganized. Partition definition is no longer a batch utility but is done via an ISPF utility, in addition to DBDGEN an system definition.

HALDB - Example

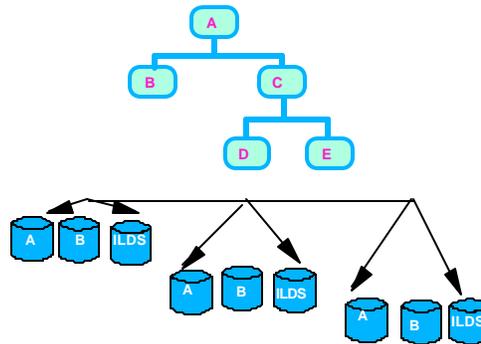


IMS Full Function DB With and Without HALDB

DB Name = MASTER
TYPE=HDAM



Master DB Name: MASTER
TYPE=PHDAM
Partitions: PART1, PART2, PART3



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- ▶ The diagram shows the layout of an existing HDAM database with 2 data set groups, and a new partitioned HDAM (PHDAM) database. The master database name remains the same but there are 3 partitions in the PHDAM database. Each partition has 2 data set groups and the new Indirect List Data Set (ILDS) to handle inter-record pointing.



- **Partition Definition Utility**
 - registers HALDB database with DBRC and defines partitions
- **Partition Initialization Utility**
 - initializes HALDB data sets before being loaded
- **Index/ILDS Rebuild Utility**
 - recovers prime index/ILDS data set
- **Migration Aid utility**
 - provides space and partition boundary recommendations

The Partition Definition Utility registers the HALDB with DBRC as well as defines the partitions. It has been discussed in prior charts.

HALDB databases must be initialized before they are loaded and used.

Either the Preorganization utility (DFSUPRO) or the new Partition Initialization Utility (DFSUPNT0) can be used.

The new Index/ILE Rebuild Utility (DFSPREC0) recovers the prime index data set and the Indirect List Data Set for a partition. The utility scans the partition and recreates the KSDS data sets from the partition data.

The existing Recovery and Image Copy utilities cannot be used for these data sets.

The new Migration Aid Utility (DFSMAID0) scans existing databases and provides statistics and recommendations to aid in the selection of partition boundaries in the new database.

HALDB Migration Considerations



- **Minimal or no application program impact**
 - handle partition unavailable condition when database is available
- **Migration/fallback path is provided**
 - IMS V7 HD Reorg Unload has FALLBACK=YES option
- **Migration from IMS Full Function database to HALDB database**
 - IMS V7 HD Reorg Unload has MIGRATE=YES option
 - IMS V7 Reorg Reload used to load database or partition
- **Migration Aid Utility provided**
- **Other considerations**
 - All logically related databases must be migrated concurrently
 - Secondary indexes must also be migrated
 - Virtual pairing logical relationship is not supported for partitioned databases

- ▶ One of the greatest benefits of HALDB supported databases is their minimal impact to application programs. Greater database capacity is achieved without application changes. One situation that must be handled by application programs that use HALDBs is when the database is available but the partition is not.
- ▶ The V7 HD Reorg Unload Utility (MIGRATE=YES option) is the only utility which produces input usable by the V7 HD Reorg Reload Utility to load a HALDB database.
- ▶ The V7 HD Reorg Unload Utility also provides a fallback option which allows a HALDB database to be unloaded to a full function non-HALDB database.

Which Databases to Convert to HALDB?



- **Very Large Databases**
 - Approaching 4 gig (VSAM) or 8 gig (OSAM) data set size limit
 - databases partitioned by other methods
- **Medium Size Databases**
 - Parallel processing for databases which require a larger batch processing window than desired
- **Smaller Databases**
 - Manageability is improved for databases requiring frequent reorganizations
- **Any Database**
 - Availability is improved when it is unacceptable to make 100% of the data unavailable at any given time

- ▶ In summary, it's not just the very large databases that are the candidates for conversion to HALDB. Even if overall capacity is not a primary concern, the benefits of increased database availability derived from managing partitions independently and improved performance when smaller partitions are reorganized independently, make almost any size database a potential candidate.

IMS Online Recovery Service Facility



- **Separately priced/orderable facility for use with IMS V7**
- **Current database recovery process - user concerns**
 - Shared databases and areas are not easily or quickly recovered
 - Change accumulation is required
 - Incomplete Change Accumulation data sets cannot be used for recovery
 - Availability
 - Recovery of database data sets and areas takes too long
 - log data sets are read sequentially
 - multiple DBDs and areas cannot be recovered simultaneously
 - Timestamp Recovery
 - does not allow sufficient granularity of the recovery timestamp in a data sharing, sysplex environment

This chart summarizes numerous user concerns and requirements about the existing IMS database recovery utility (DFSURDB0) which are addressed by the new facility for IMS V7, IMS Online Recovery Service (ORS).

Currently, the utility reads log data sets sequentially and delays occur due to tape mounting and rewind. Separate recovery jobs have to be run for each database data set or area. Shared database datasets and areas require change accumulation prior to recovery. In a sharing environment, most likely, incomplete change accumulation data sets are involved.

Timestamp Forward Recovery currently requires recovery to a timestamp on a database allocation boundary, which is not sufficiently flexible, especially in a sharing environment.

IMS Online Recovery Service Facility- Highlights



- **Recover multiple database data sets in a single pass of the log**
 - DL/I full function, HALDB, and Fast Path DEDBs supported
 - change accumulation is not required,
- **Recover databases to any point in time**
 - Also supports IMS Timestamp Forward Recovery
- **New online command-driven recovery**
 - executes in parallel with other online IMS activity
 - recovery is initiated via IMS commands rather than JCL
 - new /RECOVER command
 - ADD, REMOVE, START, STOP, QUIESCE options build list, start recovery, control recovery process
 - RCVTIME, PITR options on START for point in time recovery

The IMS Online Recovery Service is a new database recovery function for IMS that provides a simplified process with significant performance improvements.

Change accumulation data sets are no longer required for recovery in a data sharing environment, but they are optional and can be used.

Incomplete change accumulation datasets may be used as input for recovery.

Databases and areas can be started automatically after recovery as an option (except for point-in-time recoveries).

Recovery is initiated via an IMS command. The new /RECOVER command is used to control database data set or Fast Path area recovery. The user provides a list of database data sets or areas to be recovered via the /RECOVER ADD command, initiates the recovery using the /RECOVER START command, and can modify the recovery list via /RECOVER REMOVE.

Good performance is achieved by parallel processing of the input to recovery and reading the log only once no matter how many data sets are being processed for recovery.

Online Recovery Service - Benefits



- **Usability**
 - simplified recovery process for shared databases and areas
 - shared database data sets can be recovered directly from logs
 - increased flexibility of recovery options
- **Availability**
 - reduced time required for recovery of multiple databases and areas
 - no impact to IMS activity that is not recovery related
- **Coexistence considerations**
 - log data used as input to recovery must be from IMS V5 or later
 - change accumulation data sets must be created by the IMS V7 Change Accumulation Utility
 - GSAM, SHSAM, HSAM, MSDB not supported

IMS Online Recovery Service has many benefits for usability and availability.

It provides a much simpler recovery process, eliminating change accumulation as input for shared datasets. The databases and areas are unavailable for shorter periods of time due to the improved performance of the recovery process. Multiple database data sets and areas are recovered in parallel in one pass through the log.

Online Recovery Service offers more options for point-in-time recoveries (PITR). "Logical recovery" is possible after application or operations errors.

Rapid Network Reconnect - Highlights and Benefits



- **Terminals automatically reconnect to restarted IMS**
 - end user signs on again after IMS restart
- **VTAM maintains persistent session**
 - Single node persistent session (single IMS/CEC)
 - after IMS restart of failed IMS
 - network reconnects to restarted IMS in same CEC
 - Coupling Facility not required
 - multinode-persistent session (>1 CEC/IMS)
 - after IMS restart of failed IMS
 - network reconnects to restarted IMS in another CEC
 - IMS application must register in Coupling Facility MNPS structure
- **If MNPS, all VTAMs with MNPS must be connected to Coupling Facility structure**
- **Benefits**
 - Faster reconnect of terminal network after IMS restart

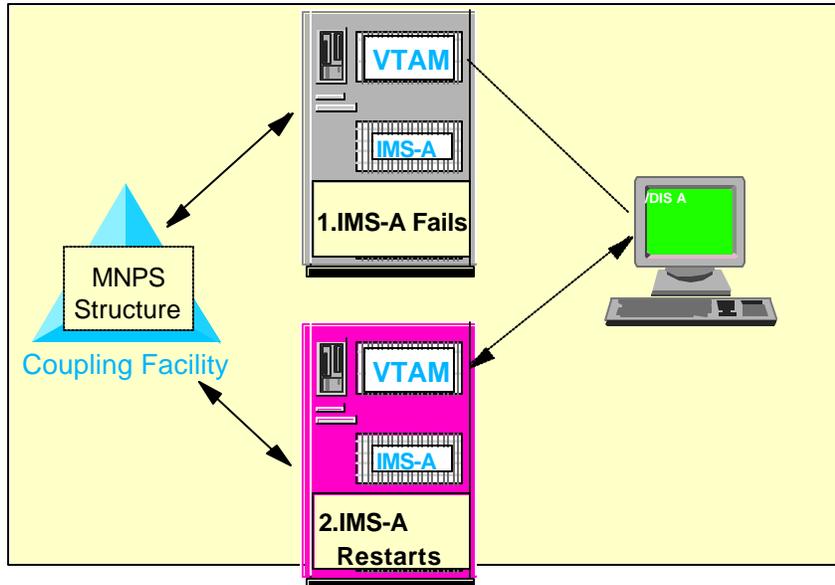
With Rapid Network Reconnect, IMS V7 allows VTAM terminal sessions to automatically reconnect to the failed IMS following an MVS, CEC, VTAM, or IMS outage and be subsequently restarted on the same or another CEC within a sysplex. The end user of the terminal session signs on again after IMS restart of the failed IMS and the session logon process is not required.

Two levels of persistent session support are provided:

- 1) Multinode where reconnect may be on another CEC in a sysplex.
- 2) single-node where reconnect must be on the same CEC as the failed IMS

This support requires an APPN network and HPR. For MNPS, all VTAMs must be connected to a CF structure. The Coupling Facility is used to track session initiate/terminate.

Multinode Persistent Session scenario



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This picture shows the Multinode persistent session scenario where failed IMS-A is restarted on another CEC in the sysplex. Sessions will be automatically reconnected when IMS-A is restarted on the other CEC.

Rapid Network Reconnect - Options and Consideration



- **Two levels of RNR support**
 - Automatic support (ARNR)
 - logon/logoff tracked in CF
 - sign on required after restart
 - No reconnect (NRNR)
- **all VTAM sessions supported except**
 - APPC conversations
 - OTMA connections
 - MSC/VTAM links
- **RNR is mutually exclusive with XRF**
- **RNR can be specified by**
 - IMS execution parameter RNR=
 - ETO logon descriptor OPTIONS= parameter
 - installation Logon Exit (DFSLGNX0)
- **Pending recovery interval set by a new execution parameter**
 - PTIMER= parameter (default is 3600)

The two RNR options may be defaulted system wide for non-MSC VTAM terminals via two new IMS execution parameters, or they be overridden by ETO logon descriptor specification (OPTION=ARNR/NRNR) or by the DFSLGNX0 logon exit routine on a session by session basis. .

ARNR, or automatic session reconnect , will use VTAM persistent session support to reconnect to a point equivalent to a logon without user signon data being made available. This will result in a DFS3649 being required, as appropriate for the terminal type.

NRNR, or no reconnect, means the terminal session will be terminated during IMS restart. The sessions can be reconnected following the /STA DC command, as occurs in prior IMS versions.

IMS Connect Facility



- **New separately-priced/orderable facility for IMS**
 - can be used with IMS V5, 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 V5/6/7 Transaction Manager

IMS Connect is a new, separately priced facility for IMS. It provides for enhanced TCP/IP access to IMS and incorporates the functions of the IMS TCP/IP OTMA Connection (TOC). IMS Connect provides enhancements for SMP installability, usability and performance. IMS Connect provides for enablement of TCP/IP clients to send messages to IMS through the IMS Open Transaction Manager Access (OTMA) interface, providing connectivity to IMS TM from any TCP/IP client application. IMS TM is thus a prerequisite for its use. Connection is provided to IMS transactions using TCP/IP from a variety of platforms, from workstation to mainframe, including the new Linux/390 operating system. Much of the function provided with IMS Connect can be used with IMS V5, V6, as well as Enhancements for asynchronous output, Unicode and Local support for 390 environments, however, are only provided for IMS V7. Future enhancements to IMS TCP/IP support will also only be provided through the IMS Connect facility for IMS V7.

Routing Exit Enhancements



- **User requirements**
 - Address additional MSC requirements for MSC exits
 - Extend to non-MSC environment
 - Provide initialization/termination exit points
 - standardize parameter interface
- **Exits combined into single program DFSMSCE0**
 - Program Routing User Exit DFSCMPR0
 - Terminal Routing User Exit DFSCMTR0
 - Input Message Routing DFSNPRT0
 - Link Receive Routing User Exit DFSCMLR0/DFSCMLR1
- **Compatibility with previous exits**
 - V7 is last release to support the existing MSC exits

Routing Exit enhancements are also provided, For ease of coding and maintenance the existing MSC exits and the Terminal Routing exit are combined into a single program, DFSMSC0, and are made available to both MSC and non-MSC environments and provide a consistent set of routing capabilities across all the exit/entry points.

This exit also provides the capability to append an optional user prefix segment in MSC messages to be used by the MSC exits. Exit control at new entry points are an option. Points include IMS initialization, application inserts to non-modifiable PCBs, and intermediate MSC systems.

A sample exit is provided, IMS V7 is the last release to support the old MSC exits.

IMS Monitor Enhancements



- **User requirements**
 - Extend monitor capabilities to Fast Path
 - gather data without performance impacts for both FF and FP
- **Highlights**
 - Fast Path Monitor support added for
 - Fast Path data bases (DEDBs, MSDBs) and Areas
 - Fast Path message queues (EMH queues, BALGs)
 - IFP dependent regions
 - Monitoring constraints added for both FF and FP
 - limit monitoring to specific dbs or areas
 - limit monitoring to specific dependent regions
 - limit monitoring specific time interval

The IMS V7 Monitor provides monitoring of Fast Path resources.

It also supports "constraints" or limitations which can be placed on what is monitored for both the full function database and fast path environments.. For example, monitoring can be limited to specific databases , areas, dependent regions or to a specific time interval. only.

This support does not include any extended reporting capability.

Events monitored for Fast Path include:

- scheduling activities in IMS FP regions
- Data Entry DB I/O activities
- Coupling Facility I/O activities
- Main Storage DB checkpoint I/O activities
- FP buffer usage statistics
- DB Locking activities (CI, UOW, segment-level)
- Transaction activities from Shared Message Queues and Shared EMH queues

The /TRACE SET ON MONITOR command is extended to honor the new constraints and to monitor Fast Path information. The status of IMS monitoring can be displayed by the existing /DISPLAY TRACE MONITOR command.

Fast Path Enhancements



- **MADS I/O Timing**

- handle "long busy" I/O requests for RAMAC type devices
 - timeout detection stops access to ADS
 - writes are saved in Coupling Facility and recovery mode initiated after the I/O has completed
 - new MADSIOT keyword in DFSVSMxx
 - requires DFSMS 1.4 (OW35775) and Coupling Facility
 - Benefit: time-sensitive applications access alternative area data set in the area
- **Expansion of compressed data for SDEP SCAN**
- new EXPANDSEG keyword for SCAN Utility
 - expanded segment passed to SCAN user exit

MADS I/O Timing:

MADSIOT=(list structure name,timeout value) is a new keyword in DFSVSMxx that controls the detection of a "long busy" state. This support is applicable only in a MADS environment . The timeout value,expressed in seconds, causes no further access to the ADS and all read/write operations go to a good ADS. When the "long busy" condition is over, the ADS is recovered using the contents of the good ADS from the list of CIs saved in the Coupling Facility.

Expansion of compressed data for SDEP SCAN:

A new keyword, EXPANDSEG, is allowed on the SCAN Utility SYSIN stream. The SCAN Utility detects the Compression Exit specified on the DBD. The SCAN user exit is passed the expanded segment for both the SORT and NOSORT cases. The DFS2671 message is changed to indicate which user exit is used and the number of segments expanded.

DB Enhancements



- **Image Copy 2 Enhancements**
 - compression option added
 - benefits - space savings for image copies
- **Change Accumulation Enhancements**
 - spill record reduction for data sharing environment
 - benefit - improved performance
- **ACBGEN Enhancements**
 - increased PSB limits
 - time/version added for Fast Path DMBs
 - selectively skip automatic PSB rebuilds
 - benefits - increased capacity, usability, performance

Additional enhancements in the database area of the product are also provided for:

Image Copy 2 Enhancements - IMS V7 provides a specification in the control card to allow the user to invoke compression for the copy. Alternatively, the DBRC.GENJCL.IC command can be used.

Change Accumulation Enhancements - In a block level data sharing environment, the Change Accum Utility creates spill records which are used for later runs of the utility whenever the utility does not have all the logs that were produced while data sharing was active. IMS V7 will produce fewer spill records than in IMS V6. The Database Recovery utility cannot accept change accum date sets with spill records; however the Online Recovery Service facility will accept these inputs.

Application Control Block (ACB) Gen Enhancements - IMS V7 adds a time and IMS version to FP DMBs in ACBLIB, similar to that available for Full Function MBs and provides other miscellaneous changes to ACBGEN to improve performance and diagnostics.

DBRC Enhancements



- **DBRC Concurrent RECON Upgrade**
 - RECON can be upgraded without stopping pre-IMS V7 systems
- **RECON Loss Notification**
 - MVS console message for RECON loss
 - benefit - automation aid
- **DBRC Support for PROCOPT=L/LS**
 - image copy required at initial database load
 - benefit - improved data integrity
- **DBRC Image Copy GENMAX**
 - GENMAX no longer automatically increased when number of image copies specified is exceeded
 - benefit - usability
- **large RECON record warning**
 - warning message
 - benefit - automation aid, increased availability
- **RECON Access improvement**
 - change to scheme to serialize accesses to RECON
 - online system favored over batch jobs
 - benefit - reduced I/O bottlenecks that impact online systems
- **DBRC serviceability**
 - LIST.DBDSGRP, LIST.HISTORY enhancements

Numerous other enhancements in IMS V7 relate to IMS Database Recovery Control (DBRC):

DBRC Support for PROCOPT=L/LS -- In IMS V7, DBRC requires an image copy after a load application (PROCIOPT=L/LS) has run and will issue a warning message for databases being updated without an image copy. Prior to IMS V7, DBRC did not require a valid recovery point after a load application had been run.

DBRC Concurrent RECON Upgrade -- Prior to IMS V7, all IMS activity needs to be shut down in order to upgrade the RECON to a new release level. IMS V7 provides a new `CHANGE.RECON.UPGRADE` command that can be issued from a DBRC batch job. The RECON must have been created by DBRC in IMS V6 or been upgraded to the V6 level. The RECON Batch Upgrade Utility is still supported for pre-V6 RECONS.

DBRC IC GENMAX Changes --In IMS V7, the GENMAX value will no longer be increased automatically. It can only be changed using the `CHANGE.DBDS` command.

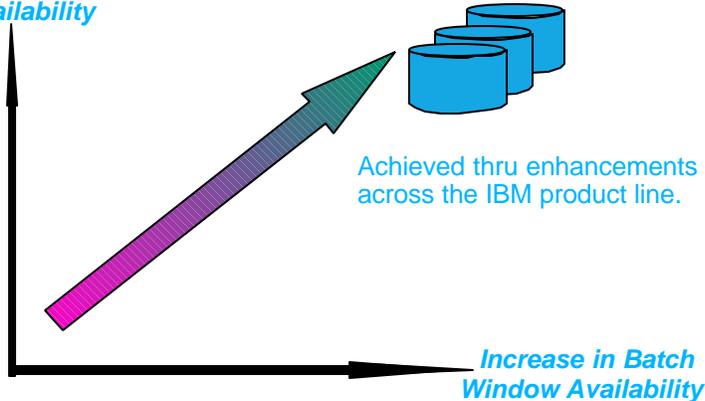
DBRC Serviceability enhancements --Debugging recovery problems often requires knowing the precise order in which different events affecting a database occurred. The `LIST.HISTORY` command provided much information, but the user was required to construct his own timeline. IMS V7 DBRC provides a graphical timeline that interrelates all activities and reduces the amount of records printed for any given Database Definitions (DBDs) or areas. Also prior to IMS V7, there was no option to provide a list of DBDSGRP names which have a member for a specific named DBD. IMS V7 provides a new optional value on the existing `ALL` parameter which lists all of the DBDSGRP records containing the specified member(s).

Enterprise Storage Server Support providing Enhanced I/O Performance



*Increase in
Bandwidth
Availability*

IMS Serving Mission-critical Applications and Data Access across the Enterprise and over the Internet



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IMS V7 Overview 8/00

IMS solutions also exploit IBM Enterprise Storage subsystem products to optimize performance. Testing with IMS Version 7 and the Enterprise Storage Server (ESS) have demonstrated increases in Online Log Data Set logging Bandwidth and in Batch window availability.

Test results indicated a possible 1/3 reduction in utilities and sequential update Batch Message Programs that increase the overall batch window availability.

They also indicated an overall improvement of 175% in bandwidth over the IBM RAMAC Virtual Array (RVA) storage subsystem and 500% over the IBM RAMAC2 storage subsystem.

We are continuing to identify, develop, and exploit new features and advance functions together with IBM's OS/390, Network, Storage and Enterprise servers to provide continually increasing performance for our customers. And we are publishing the details of these measurements in our Newsletters and on our website.

TM Enhancements



- **CQS Enhancements for Shared Queues**
 - allows up to 32 clients to use the same CQS
- **BPE Enhancements**
 - users can define own commands and routines
- **Asynchronous APPC/OTMA for shared queues**
 - asynchronous APPC input messages (non-response) can be processed in any IMS in the sysplex
 - OTMA Commit-then-send (commit mode 0) input messages can be processed in any IMS in the sysplex
 - benefit: enhanced workload balancing in a sysplex
- **Associated printer support**
 - supported in shared queues environment
- **Deferred VTAM ACB Open**
 - option to open VTAM ACB at /STA DC time
- **Queue Space Notification Exit enhancement**
 - stopped status for conversation transaction destinations
- **RACF (or equivalent) Pass Ticket Support**
 - new APPL parameter on /SIGNON command

There are also a number of additional IMS V7 Transaction Manager enhancements:

Associated Printer Support: By enabling autologon to a printer, enqueued messages from a backend application can be delivered to the associated front end printer when shared queues is used in a parallel sysplex environment.

Asynchronous APPC/OTMA for shared queues: The restriction in IMS V6 that APPC/OTMA messages must be processed in the IMS that receives them is removed for asynchronous type APPC input messages (non-response mode messages) and for OTMA commit-mode 0 messages.

Queue Space Notification Exit enhancement: The exit is notified of a stopped destination so that action could be taken to prevent the system from being saturated with undeliverable messages.

RACF (or equivalent) Pass Ticket Support: The /SIGN ON command accepts a new keyword, APPL, which allows an application name to be specified when creating a Pass Ticket . A Pass Ticket is used as an alternative to a password and removes the need to send RACF (or equivalent) passwords across the network.

TM Enhancements (continued)



- **USERID Clarification**
 - IOPCB/INQY indicates whether userid field is user id, PSB name, or LTERM name
- **SLUP/Finance Session Coldstart**
 - /CHANGE NODE command enhanced with new COLDSESS keyword; allows session coldstart w/o IMS coldstart
- **SPOOL enhancement**
 - improved EOF writes
 - IMSWT= execution option in DFSDCxxx
- **SLU2 enhancement**
 - option to suppress SNA exception response
 - SLU2=EXR/NOEXR option in DFSDCxxx
- **ETO Enhancements**
 - ETO descriptor record limit removed
 - Autologon and /OPNDST command compatibility
 - allow LTERM assignment to nonexistent users

Spool Enhancements: A new IMSWT= specification is allowed in DFSDCxxx. A five character specification replaces the first five characters of the IMSWTxxxJOBNAME in the /START REGION IMSWTxxx for auto scheduling the spool print utility.

Autologon (ETO enhancement): When a user is signed on to an ETO terminal interactively, such as in an interactive signon, or using the /OPNDST command, that terminal is not available for autologon of other users until the first user is signed off, either via /SIGN OFF or via an ASOT timeout.

ETO descriptor limit: The existing limit of 50 records per descriptor for ETO descriptors is removed.

Packaging and IVP Enhancements



- **New separately priced/orderable facilities**
 - IMS Online Recovery Service
 - IMS Connect
- **OS/390 naming standards for IMS datasets**
 - Distribution Library: ADFS prefix
 - Target Library: SDFS prefix
- **System Definition Reduction**
 - modules moved from IMS system definition to DFSJCLIN
 - DFSRESL populated via SMP install and IMS system definition
- **Single set of macro libraries**
 - consolidation of GENLIBA,B,C into single library
 - macro name standardization to DFS-prefix
- **IVP Enhancements**
 - usability enhancements
 - supports Java and HALDB

Additional Packaging and Installation Verification Program (IVP) enhancements are provided:

IMS datasets are renamed in IMS V7 to conform to the OS/390 naming standards. Gone are names such as "RESLIB", replaced by "SDFSRESL". The former macro libraries, GENLIBA, GENLIBB, and GENLIBC are consolidated into a single library, SDFSMAc.

Over 1000 modules are moved from system definition to DFSJCLIN.

The IVP is enhanced to support DFSMS classes and the IVP/install panels have been changed to conform to the common look and feel of other IBM products, ISPF/PDF CUA 98 is supported.

And new samples are provided.

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

A few enhancements with IMS V7 are also available through the service process for IMS V6 as well.

I/O performance enhancements are provided with Fiber channel connectivity (FICON) support and Enterprise Storage Server (ESS) support.

VTAM Generic Resources enhancement: - A new execution option, GRAFFIN=VTAM allows VTAM to reset the session affinity to a failed IMS so that the session can be established with the surviving IMS in a sysplex. Prior to this support, terminals such as SLUP devices retained affinity to the failed IMS because of STSN (set and test sequence numbers) resynchronization was mandatory. The use of this option resets the STSN numbers to 0 for STSN-type devices, and is useful if applications are designed to tolerate this reset. This global option also allows conversation and fast path response mode to be reset so that affinity can be deleted for static terminals.

The Open Transaction Manager Access (OTMA) Callable Interface improves IMS Connectivity by providing a high-level interface for access to IMS applications from other OS/390 subsystems. It presents an Application Program Interface (API) to application programs to enable access through IMS OTMA facilities.

An Open Database Access Facility is also provided for access to IMS Databases outside of IMS TM and/or CICS. This provides a callable interface to IMS DB data. One of the first examples of use of this is through the DB2 Stored Procedures where stored procedures can now invoke IMS DB data as well as DB2 data.