Version 2 Release 2

IBM IMS Performance Solution Pack for z/OS
Overview and Customization

IBM
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Overview and Customization

IBM
Note:
Before using this information and the product it supports, read the "Notices" topic at the end of this information.
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IBM® IMS Performance Solution Pack for z/OS® (also referred to as IMS Performance Solution Pack) is a product that provides a comprehensive portfolio of IBM IMS performance management tools.

IMS Performance Solution Pack combines the following products into a single offering:

- IBM IMS Connect Extensions for z/OS V3.1
- IBM IMS Performance Analyzer for z/OS V4.4
- IBM IMS Problem Investigator for z/OS V2.5

These topics provide an overview of the products and capabilities delivered with IMS Performance Solution Pack as well as a selection of usage scenarios to help you understand the capabilities of the combined product suite. It also includes post-SMP/E installation instructions which must be performed before these products can be used.

These topics are designed to help database administrators, system programmers, application programmers, and system operators perform the following tasks:

- Understand the capabilities of the functions that are associated with IMS Performance Solution Pack
- Plan for the installation of IMS Performance Solution Pack
- Migrate from previous releases of the tools that comprise IMS Performance Solution Pack
- Perform the post-SMP/E installation of IMS Performance Solution Pack

Before using this product, you should have a working knowledge of:

- The z/OS operating system
- ISPF
- IMS Database (IMS DB) and IMS Transaction Manager (IMS TM) systems
- IMS Connect

Always check the IMS Tools Product Documentation page for the most current version of this information:

http://www.ibm.com/software/data/db2imstools/imstools-library.html
IBM IMS Performance Solution Pack for z/OS overview

IBM IMS Performance Solution Pack for z/OS (also referred to as IMS Performance Solution Pack) provides a comprehensive portfolio of IBM IMS performance management tools.

IMS Performance Solution Pack V2.2 combines the following tools into a single offering:

**IBM IMS Connect Extensions for z/OS V3.1**
Enhances the manageability of TCP/IP access to IMS through IMS Connect, an integrated function of IMS.

**IBM IMS Performance Analyzer for z/OS V4.4**
Provides comprehensive transaction performance and system resource usage reporting for your Information Management System Database (IMS DB) and Transaction Manager (IMS TM) systems.

**IBM IMS Problem Investigator for z/OS V2.5**
Enables interactive analysis of log files to gain insight into IMS transaction events within and across systems.

The three products are complementary, making the end-to-end analysis of IMS transactions faster and easier, supporting improved productivity for problem analysts, improved IMS application performance, increased the efficiency of IMS resource utilization, and providing higher system availability.

Topics:
- “What does IMS Performance Solution Pack do?”
- “Benefits” on page 8
- “Product dependencies” on page 9
- “Product publications” on page 9
- “Service updates and support information” on page 9
- “Product documentation and updates” on page 10
- “Accessibility features” on page 11

What does IMS Performance Solution Pack do?

IMS Performance Solution Pack provides a comprehensive solution for reporting on IMS performance and diagnosing performance problems.

IMS Performance Solution Pack provides integration of the following IBM IMS tools:
- “IMS Connect Extensions V3.1” on page 2
- “IMS Performance Analyzer V4.4” on page 4
- “IMS Problem Investigator V2.5” on page 6

The three products are complementary, making the end-to-end analysis of IMS transactions faster and easier, supporting improved productivity for problem analysts, improved IMS application performance, more efficient IMS resource utilization, and higher system availability.
The following diagram illustrates the interaction between IMS Connect Extensions, IMS Performance Analyzer, and IMS Problem Investigator. When IMS Connect event details in IMS Connect Extensions journals are merged with IMS (and related) logs, IMS Performance Analyzer and IMS Problem Investigator can provide a comprehensive insight into the lifecycle of IMS transactions.

![Diagram of IMS Connect Extensions, IMS Performance Analyzer, and IMS Problem Investigator interaction](image)

**Figure 1. End-to-end tracking and reporting using IMS Performance Solution Pack**

IMS Problem Investigator, IMS Performance Analyzer, and IMS Connect Extensions can be used together for end-to-end tracking and reporting of transactions from IMS Connect to IMS, or they can be used separately in a variety of useful ways.

**Related concepts:**

“Scenarios” on page 13

These scenarios demonstrate just some of the ways in which IBM IMS Performance Solution Pack for z/OS can help you improve the performance of your IMS system environment.

**IMS Connect Extensions V3.1**

IMS Connect Extensions is a tool that enhances the operation of IMS Connect. IMS Connect, a function of IMS, is the premier pathway for accessing IMS applications and databases via TCP/IP.
IMS Connect Extensions extends IMS™ Connect by providing the following features:

**Monitoring and recording of IMS Connect activity**
IMS Performance Solution Pack provides a detailed audit of activity, giving you the information you need to analyze performance, throughput, resource availability, and security. You can use this information to debug clients and new applications. Use the IMS Performance Solution Pack feed to expose near real-time IMS Connect transaction summary data to analytics platforms. This includes information regarding the message’s origin, its destination, and the overall response time.

**Single point of control for multiple IMS Connect systems**
Centralized management of all your IMS Connect systems, including monitoring and control of OTMA and Open Database workloads, MSC physical links, and remote IMS Connect systems, from an ISPF Operations dialog or from the IMS Performance Solution Pack Operations Console for z/OS Explorer. Use the IMS Performance Solution Pack host command environment for REXX to automate operations management tasks as desired.

**Enhanced workload management**
Dynamic management of TCP/IP transactions, allowing you to define routing rules to automatically balance and distribute workloads and reroute messages when IMS system failures occur. Temporarily suspend routing of messages to an IMS data store to reduce the likelihood of transactions failing or being rejected when IMS is shut down. Ability to
assign selected OTMA routing rules to a routing plan and dynamically switch between routing plans. Automatically respond to changes in the IMS environment such as dynamically added IMS data stores and flood conditions. Automatically respond to the failure of an IMS™ Connect system by balancing the number of TCP/IP sessions directed to each remaining live IMS Connect system.

**Enhanced Open Database management**
Dynamic management of TCP/IP DRDA requests, allowing you to define rules to redistribute workload based on capacity or by relative machine running costs. Ability to assign selected ODBM routing rules to a routing plan and dynamically switch between routing plans.

**Socket management**
Controls the number of input messages for a persistent session, allowing automatic distribution of persistent session workloads in a sysplex environment.

**Enhanced security**
Control access to OTMA transactions or DRDA requests based on the client IP address and IMS Connect port number, and to IMS Connect instances, via a system authorization facility (SAF) security class. Use IP address rules to treat messages coming from an IP address as a trusted user or to assign a specific user ID to the request.

**Improved client services**
Additional features for IMS Connect clients such as enhanced information in error messages, password change facility, and extended message translation.

These features enable you to:
* Improve the availability, reliability, and performance of IMS Connect.
* Speed and simplify problem determination.
* Make your systems more transparent so that they are easier to audit and manage.

**IMS Performance Analyzer V4.4**
IMS Performance Analyzer (IMS PA) provides comprehensive transaction performance and system resource usage reporting for IMS Database (IMS DB) and Transaction Manager (IMS TM) systems.

IMS Performance Analyzer has become the standard for IMS resource and performance management. It provides a comprehensive set of performance metrics that help you to perform the following tasks:
* Analyze transaction response time.
* Measure usage and availability of important resources, including databases, programs, regions, buffers (including database) and queues (message and other internal queues).
* Plan for IMS operational management, including scheduling database reorganizations, monitoring service level adherence, chargeback accounting, and capacity planning.
* Monitor significant system events that can adversely affect system performance and availability.
* Boost system and application programmer productivity.
• Report critical performance information, from high-level management summaries to detailed traces for in-depth analysis.

• Analyze the impact of IMS Connect on transaction performance using [IMS Connect Extensions] journals.

**Forms-based reporting**

Create tailored reports from IMS Performance Analyzer using Forms-based reporting. Using log data and a personalized Report Form, IMS Performance Analyzer can generate Forms-based reports and CSV extracts. These can be loaded into Db2® tables or imported into PC spreadsheet applications (not supplied) where the data can be further analyzed and charted.

![Diagram of IMS Performance Analyzer Forms-based Log reporting](image)

**Figure 3. IMS Performance Analyzer Forms-based Log reporting**

**IMS Transaction Index**

The IMS Transaction Index is a specialized extract file created using IMS Performance Analyzer.

Each record in an IMS Transaction Index represents an IMS transaction and contains accumulated information about each transaction from the original IMS log files.

[IMS Problem Investigator] uses the index with transaction tracking to help make problem determination faster and easier.

As shown in the following diagram, IMS Performance Analyzer uses transaction information in the IMS Log to create the IMS Transaction Index, which can then be used by both IMS Performance Analyzer and [IMS Problem Investigator] to help make log reporting and analysis more efficient.
IMS Performance Analyzer can also generate an IMS Connect Transaction Index which accumulates transaction information from IMS Connect Extensions journals.

**IMS Problem Investigator V2.5**

IMS Problem Investigator (IMS PI) helps determine the cause of problems in an IMS systems environment and helps trace the flow of events end to end.

IMS Problem Investigator is a powerful problem analysis aid for IMS DB and IMS TM systems that helps make identifying and resolving problems faster and easier. It allows you to analyze log files from a variety of sources to gain insight into IMS transaction events within and across systems. You can interactively explore formatted, interpreted, and easily customizable views of log records. Then, you can use the results to help identify and analyze problems quickly, even if you do not have an expert understanding of log data structures and the relationships between log records.

To rapidly diagnose and resolve problems, use **IMS Performance Analyzer** first to highlight performance problem areas, and then analyze them in more detail with IMS Problem Investigator.

IMS Problem Investigator supports the following types of logs:

- IMS logs
- The **IMS Transaction Index** containing transaction summary records. The index is created by **IMS Performance Analyzer** using the IMS log
- IMS TM and IMS DB monitor data sets
- Common Queue Server (CQS) log streams and extracts
- IMS Connect event data that is collected by **IMS Connect Extensions**
- The **IMS Connect Transaction Index** containing IMS Connect transaction summary records. The index is created by **IMS Performance Analyzer** from data in the **IMS Connect Extensions** journal.
- OMEGAMON® for IMS Application Trace Facility (ATF) log streams and extracts
- IBM Db2 logs
- IBM MQ log extracts
- SMF: IRLM Long Lock records
- IMS Trace Table entries (IMS log record codes 67FA and 67FF)
- IMS Repository Audit log streams and extracts

**Log file merging**

IMS Problem Investigator can merge data from multiple log input files from multiple IMS and IMS Connect systems. The following diagram shows that you can use dialog and batch reporting facilities (CSV files, log extracts, and reports) to analyze the merged log data from a number of systems in a sysplex to pinpoint where and why a performance problem occurred.

Records are processed (reported or extracted) in time sequence as if they were read from a single log file. The time sequence is determined by the STCK time stamp in the log record suffix.

Typically, the most efficient way to process sysplex log data is to use *automated file selection*. Automated file selection ensures that the correct SLDS (and optionally OLDS) log files for all IMS systems, and the correct

![Figure 6. Using IMS Problem Investigator to processing IMS logs from multiple systems in a sysplex to identify the location of a problem](image-url)
journals for all IMS Connect systems, are selected for your specified reporting interval.

**End-to-end transaction analysis**

IMS Performance Solution Pack enables cross-system end-to-end transaction analysis. With IMS Problem Investigator, you can use automated file selection to select the relevant data files, merge them, and write filtered records from the merged files to an extract data set. The extract data set can then be merged with other files and analyzed using the IMS Problem Investigator ISPF dialog. Records can also be analyzed using batch utilities, REXX programming services, and you can create filtered extracts and CSV files to aid problem investigation. Smaller extract files are easier to analyze, but similar efficiencies can be obtained with the original large log files by using the time slicing feature.

You can perform the following tasks with the IMS Problem Investigator ISPF dialog:

- View formatted logs with detailed field descriptions. Set color and highlighting according to log type.
- Navigate to an exact point in time within a log file.
- Investigate specific problem areas. For example, transaction, database, security, or checkpoint processing.
- Merge log files to combine different aspects of IMS processing into a single view.
- Track the flow of a transaction in a single system or across a sysplex.
- Track entire transactions, including program switches, and drill down to isolate an individual unit of recovery.
- Determine response times and latencies.
- Extract the current result set (of log records from filtering and tracking) into a data set for later analysis.

The IMS logs are a rich source of information about your IMS environment because they provide essential data for many business functions. While the logs supply data for business functions, they were not primarily designed for such purposes. Without IMS Problem Investigator, much of the valuable information in the logs can be hard to understand.

Through its emphasis on interactive analysis and easy customization, IMS Problem Investigator can help speed and simplify log analysis, allowing you to use IMS and related logs for tasks such as debugging, performance tuning, tracing, and creating audit trails.

**Benefits**

IMS Performance Solution Pack offers a suite of tools which provide a powerful performance analysis capability.

Each of the tools that comprise IMS Performance Solution Pack provide you with a wealth of insight into activity within IMS.

When used together, they help to provide the following analysis potential:

**Reduced downtime**

Rapidly isolate problems in complex and interrelated enterprise systems.
Improved performance
Pinpoint exactly where and why transactions are delayed. Solve problems with new and existing applications and transactions. Quickly eliminate IMS Connect as the source of performance problems and determine whether the problem is in OTMA, MQ, Db2, shared queues or any of many other subsystems. Helps you meet your service level agreements (SLAs) and conduct capacity planning.

Improved productivity
Automated file selection, merging, and formatting allows staff to focus on solving business problems rather than finding and formatting logs. Automatically select and combine IMS Connect Extensions journals with IMS logs to view only those records from the time of day that a problem occurred. Interactively browse log records, navigate by the time of day, and select records to drill down right to the values of individual flag bits.

Improved understanding
Exposé the inner workings of IMS to your staff. Map the life cycle of individual transactions. View formatted logs with detailed field descriptions. Audit changes, security violations, and transaction pathways. Enable less experienced team members to perform advanced analysis and to improve their IMS knowledge. Generate customized performance reports.

Product dependencies
IMS Performance Solution Pack is installed by using SMP/E and standard RECEIVE, APPLY, and ACCEPT processing.

Complete information about installation requirements, prerequisites, and procedures for IMS Performance Solution Pack V2.2 is located in the Program Directory for IBM IMS Performance Solution Pack for z/OS, GI13-4905.

Product publications
For detailed information about the component products in IMS Performance Solution Pack V2.2, refer to the publication libraries of the individual products.

IBM IMS Connect Extensions for z/OS Version 3 Release 1
User’s Guide (SC27-9517)

IBM IMS Performance Analyzer for z/OS Version 4 Release 4
User’s Guide (SC19-4365)
Report Reference (SC19-4366)

IBM IMS Problem Investigator for z/OS Version 2 Release 5
User’s Guide (SC27-9600)

Service updates and support information
Service updates and support information for this product, including software fix packs, PTFs, frequently asked questions (FAQs), technical notes, troubleshooting information, and downloads, are available from the web.

To find service updates and support information, see the following website:
Product documentation and updates

IMS Tools information is available at multiple places on the web. You can receive updates to IMS Tools information automatically by registering with the IBM My Notifications service.

Information on the web

The IMS Tools Product Documentation web page provides current product documentation that you can view, print, and download. To locate publications with the most up-to-date information, refer to the following web page:

http://www.ibm.com/software/data/db2imstools/imstools-library.html

You can also access documentation for many IMS Tools from IBM Knowledge Center:

http://www.ibm.com/support/knowledgecenter

IBM Redbooks® publications that cover IMS Tools are available from the following web page:

http://www.redbooks.ibm.com

Receiving documentation updates automatically

To automatically receive emails that notify you when new technote documents are released, when existing product documentation is updated, and when new product documentation is available, you can register with the IBM My Notifications service. You can customize the service so that you receive information about only those IBM products that you specify.

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2. Enter your IBM ID and password, or create one by clicking register now.
3. When the My Notifications page is displayed, click Subscribe to select those products that you want to receive information updates about. The IMS Tools option is located under Software > Information Management.
4. Click Continue to specify the types of updates that you want to receive.
5. Click Submit to save your profile.

How to send your comments

Your feedback is important in helping to provide the most accurate and high-quality information. If you have any comments about this book or any other IBM product documentation, use one of the following options:

• Use the online reader comment form, which is located at http://www.ibm.com/software/data/rfc/

• Send your comments by email to comments@us.ibm.com. Include the name of the book, the part number of the book, the version of the product that you are using, and, if applicable, the specific location of the text you are commenting on, for example, a page number or table number.
Accessibility features

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use a software product successfully.

The major accessibility features in this product enable users to perform the following activities:

- Use assistive technologies such as screen readers and screen magnifier software. Consult the assistive technology documentation for specific information when using it to access z/OS interfaces.
- Customize display attributes such as color, contrast, and font size.
- Operate specific or equivalent features by using only the keyboard. See the following publications for information about accessing ISPF interfaces:
  - z/OS ISPF User’s Guide, Volume 1
  - z/OS TSO/E Primer
  - z/OS TSO/E User’s Guide

These guides describe how to use the ISPF interface, including the use of keyboard shortcuts or function keys (PF keys), include the default settings for the PF keys, and explain how to modify their functions.
Scenarios

These scenarios demonstrate just some of the ways in which IBM IMS Performance Solution Pack for z/OS can help you improve the performance of your IMS system environment.

Table 1. IMS Performance Solution Pack products used in each scenario

<table>
<thead>
<tr>
<th>Scenario</th>
<th>IMS Connect Extensions</th>
<th>IMS Performance Analyzer</th>
<th>IMS Problem Investigator</th>
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<tr>
<td>“Determining the cause of TCP/IP client delays” on page 14</td>
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- “Analyzing IMS-to-IMS TCP/IP connections” on page 37
- “Analyzing Open Database transactions” on page 37
- “Customized reports using Report Forms” on page 38

Related concepts:
- “What does IMS Performance Solution Pack do?” on page 1

IMS Performance Solution Pack provides a comprehensive solution for reporting on IMS performance and diagnosing performance problems.
Determining the cause of TCP/IP client delays

In a TCP/IP-enabled environment, IMS Connect Extensions and IMS Performance Analyzer can, together, help you identify performance problems in IMS Connect or OTMA, and to eliminate these components as potential causes of problems. Once you have isolated the problem, IMS Problem Investigator can help you understand why the problem occurs and resolve it.

This scenario demonstrates that a web services client may experience poor transaction performance even if traditional tools show that the transaction is performing well. The scenario identifies the causes of such a disparity, and then shows how to extend reporting to gain a more complete picture of transaction performance. The IMS Performance Solution Pack can bridge the gap between the web client's perspective of transactional performance and the IMS perspective of transactional performance.

Features used in this scenario

- **IMS Connect Extensions**
  - Event collection via IMS Connect Extensions journal

- **IMS Performance Analyzer**
  - Combined reporting with IMS and IMS Connect
  - Create CSV extract

- **IMS Problem Investigator**
  - Log file merging
  - Transaction tracking
  - Elapsed time view

Scenario description

Suppose your organization provides web access to your IMS applications and your web users are reporting long delays from IMS. When web clients connect to IMS, there are at least three more components that contribute to transaction performance before the input message is even queued. Those same three components also contribute to transaction performance after a response to the client is placed on the output queue.

The following figure shows message transit from WebSphere Application Server through IMS Connect, OTMA, and IMS. The client registers unacceptable responses of more than two seconds, but the IMS performance tools shows sub-second responses from the message placed on the input queue to the message placed on the output queue.
The clients report unacceptable delays; IMS processing (from input message being queued to response being placed on the output queue) itself registers sub-second responses. What do you do in this situation to identify the source of the problem and to eliminate those components that are performing well?

The data that IMS Connect Extensions collects and the reports that IMS Performance Analyzer can produce from that data are vital for problem determination. IMS Performance Analyzer reports can combine the IMS Connect Extensions journal records with the IMS log to provide an end-to-end overview of the transaction.

The following figure shows a graph produced by a common PC spreadsheet application (not supplied) from an IMS Performance Analyzer CSV extract. It shows IMS performance to be steady and below 100th of a second throughout the day.
The addition of journals from IMS Connect Extensions allows us to see IMS Connect and OTMA performance throughout the day. The source of the problem is clear: it is in IMS Connect. Now that we know where the problem is, we can use IMS Problem Investigator to identify why the problem occurs.

The IMS Problem Investigator dialog provides a variety of facilities for exploring log data interactively and helps you to determine the history of events and the cause of problems; facilities such as tracking transactions and units of work, applying filters and forms, calculating relative times, accommodating different time zones, navigating to a particular time of day or record number, and skipping forwards or backwards through the file by specified time intervals.

Summary

With the combination of IMS Performance Analyzer, IMS Problem Investigator, and IMS Connect Extensions, you can quickly eliminate or verify IMS Connect and OTMA as the source of a problem. In the absence of these tools, you cannot get a single unified view of problem transactions, and resolving and identifying problems requires more time and more skill in the various IMS components.

From real-time problem mitigation to problem determination

IMS Connect Extensions Operations Console is an Eclipse-based graphical user interface (GUI) client that allows you to view activity on IMS Connect systems and control the state of these systems. It provides you with enough information about active sessions so that you can track those sessions in IMS Problem Investigator for later advanced analysis. The IMS Connect Extensions Operations Console plug-in can be installed into IBM Explorer for z/OS (also referred to as z/OS Explorer).

Features used in this scenario
**IMS Connect Extensions Operations Console**

- Status monitor, providing basic real-time statistics on activity in IMS Connect.
- Active sessions, containing details of all sessions currently running in IMS Connect.

**IMS Problem Investigator**

- Transaction tracking, allowing more detailed analysis of events when the problem occurred.

**Scenario description**

A customer reports a problem connecting to IMS Connect. IMS Connect Extensions identifies that a previous connection attempt has hung, preventing new connection attempts. Using the Operations Console, you can then cancel the session to allow new connections, but not before details of that session are recorded. Using the information from IMS Connect Extensions, you can then perform an analysis of the root cause of the problem and perform the required corrective measures.

The following figure shows the **IMS Connect Extensions Operations Console**. You can see which systems are active, and then browse activity for each system, or multiple systems at the same time. In this case, we can see only a low volume of activity entering IMS Connect, with no messages returning errors.

![IMS Connect Extensions Operations Console](image)

*Figure 9. IMS Connect Extensions Operations Console: Monitoring system status*

As shown in the following figure, you can then examine all sessions currently running on the system. If there is a large number of sessions, you can use filters to identify just the sessions that interest you.
The problem session might now be obvious. You can prepare to cancel the session from the console to allow new connections with the same client ID.

Before cancelling the session, you can export the details of the session (or multiple sessions) to an extract file for more advanced analysis in **IMS Problem Investigator**. The extract file will include information such as the Event Key, the time of day the problem occurred, client ID, LTERM name, and more.

**Summary**

With the IMS Connect Extensions Operations Console, your frontline support staff can be more directly involved in problem mitigation. The ability to correlate information in the Operations Console with the data that IMS Problem Investigator can browse ensures that your IMS programmers can perform advanced analysis if required.

### Determining why transactions are falling below SLA

More than a quarter of transactions are falling below your service level agreement (SLA). This scenario demonstrates how you can use **IMS Performance Analyzer** to monitor your SLAs and when agreements are not met, introduce **IMS Problem Investigator** to discover exactly where the problem occurs.

**Features used in this scenario**

- **IMS Performance Analyzer**
  - Distribution reporting
  - **IMS Transaction Index**

- **IMS Problem Investigator**
  - Log file merging; specifically Db2 and SMF log file support
  - Transaction tracking
  - Elapsed time view

**Scenario description**
An IMS Performance Analyzer Forms-based Summary Log report has been set up in your environment to observe transaction resource usage with a customized Report Form. The report reveals that 28% of DSN8CS transactions take more than two seconds to complete:

From this information, you decide to run an IMS Performance Analyzer Forms-based List report. Using another customized Report Form, the report shows individual DSN8CS transactions, and allows you to focus specifically on transactions that took longer than two seconds to complete:

You can pinpoint the exact time of day that a problem transaction occurred, but this gives no indication of the cause. As DSN8CS is a transaction that involves Db2, the cause of the delay may be outside of IMS.

Determine the exact cause of the problem using the following procedure:

1. Use **IMS Performance Analyzer** to generate an IMS Transaction Index from the IMS log. The IMS Transaction Index includes all the data you can generate in a list report (and more) in a format that IMS Problem Investigator can read.

2. Use **IMS Problem Investigator** to perform the following tasks:
   a. Merge the IMS Transaction Index, IMS log, SMF logs, and Db2 logs.
   b. Use the IMS Transaction Index to show transactions that took longer than two seconds to complete by entering a filter condition:
c. Use tracking to reveal all the log records from IMS, Db2, and SMF for the problem transaction.

d. Step through the transaction and see exactly where the problem occurred.

Figure 13. IMS Problem Investigator: Specify filter conditions for the IMS Transaction Index
When you activate tracking in IMS Problem Investigator, the following information is displayed:

**0020 DB2 Unit of Recovery Control - Begin UR**
Db2 start of UOR. This uniquely identifies the transaction so that you can use Db2 analytical tools to further analyze the Db2 side of the problem.

**101 DB2 Accounting**
SMF accounting record. It shows high page fetch and update activity, as well as high CPU usage.

**07 Application Terminate**
The IMS termination record. It reveals the source of the problem: it shows that most of the CPU time was spent in Db2.
Summary

With the combination of IMS Performance Analyzer you can monitor your service level agreements. When IMS Performance Analyzer reporting identifies that you are not meeting your SLAs, you can feed the transaction information it stores into IMS Problem Investigator and track down the source of the problem, even if it is outside IMS.

Tip: If your transactions use the MQ bridge or adapter, you can use the same methodology described here to identify or eliminate MQ as the source of the problem. Simply input MQ logs into IMS Problem Investigator instead of (or as well as) your Db2 logs.

End-to-end analysis of an IMS transaction with Db2 and IMS Connect activity

IMS Problem Investigator transaction tracking allows you to focus on activity related to a particular transaction. Tracking helps performance analysts isolate where problems occur and track them back to their source.

Features used in this scenario

- **IMS Connect Extensions**
  - Event collection via IMS Connect Extensions journal

- **IMS Problem Investigator**
  - Log file merging
  - Transaction tracking
  - Relative time view

Scenario description

Perform end-to-end analysis of IMS transactions by merging the IMS Connect Extensions journal, IMS logs, and Db2 logs with IMS Problem Investigator. Use IMS Problem Investigator to track important transactions, and use the relative time view to observe sudden jump in elapsed time.
In the previous figure, we can see the following sequence of events:

1. IMS Connect receives transaction request via TCP/IP.
2. IMS Transaction Manager (TM) receives request from IMS Connect, and starts processing the transaction.
3. Transaction starts Db2 activity.
4. Sudden jump in elapsed time indicates the Db2 Insert took over 2 seconds! Why? Select this event to view the details and begin analysis.
5. IMS Connect receives transaction response from IMS TM, and sends it to the client via TCP/IP.
6. IMS TM ends transaction.

**Summary**

IMS Problem Investigator, together with the information provided by the IMS Connect Extensions journal, can help you improve your understanding of your IMS environment. It allows less experienced team members to perform advanced analysis and to learn about the life cycle of individual transactions.
Tracking an IMS transaction across related systems

You can use **IMS Problem Investigator** to analyze log data from a variety of sources, including OMEGAMON for IMS Application Trace Facility (ATF), Db2, IBM MQ, and SMF.

**Features used in this scenario**

- Log file merging
- Transaction tracking
- Elapsed time view
- OMEGAMON for IMS Application Trace Facility (ATF) support
- Db2 support
- IBM MQ support
- SMF: IRLM Long Lock support

**Scenario description**

Using the dialog or batch reporting, you can use **IMS Problem Investigator** to merge IMS log data with the logs from related systems, apply forms and filters, and track the activity of a single transaction as it progressed through IMS with calls to the related systems. If the transaction included program switches, you can track an individual unit of recovery within the transaction. IMS Problem Investigator provides additional support for tracking transactions across systems in the following ways:

**OMEGAMON for IMS Application Trace Facility (ATF) support**

The Application Trace Facility (ATF) for IBM OMEGAMON for IMS on z/OS provides detailed application-level monitoring of database calls and CPU utilization.

The ATF component collects detailed data about IMS Monitor events that occur within one or more transactions. The ATF supports the MPP, JMP, IFP, BMP, JBP, CICS®/DBCTL, and ODBA IMS application and region types, and collects the following types of data:

- Application abends
- Application API call details for each occurrence of a DL/I, Db2 SQL, and IBM MQ call
- Application elapsed times and processor times for each event and associated region
- External subsystems events that are related to the processing of Db2 and IBM MQ threads
- Other IMS Monitor events that are associated with API calls
- Properties of a transaction and its environment, such as the region where the transaction runs
- Transaction scheduling and termination

The analysis of the data collected by the ATF can be used in IMS Problem Investigator to:

- Identify transaction response-time components
- Fine-tune applications
- Understand how application programs operate
In addition, the ATF component can write to the IMS logging environment one record per transaction or program execution instance. The record contains summarized information of DL/I, DB2®, and MQ calls with counts, elapsed and CPU times. The records can be used for application performance reporting.

Db2 support

IMS Problem Investigator can be used to report records in Db2 log files. IMS and Db2 events within a single IMS transaction can be reported when merging IMS and Db2 log files. This allows you to measure transaction event latencies and to investigate performance problems when IMS transactions use Db2 databases.

IMS Problem Investigator supports both Db2 archive and active log files.

When merged with the IMS log file, Db2 and IMS events associated with IMS transactions can be viewed together in a single diagnostic session. Merging Db2 with IMS log data allows you to:

• Track both IMS and Db2 events associated with an IMS transaction, to help determine whether Db2 is the cause of a problem in IMS.
• Measure Db2 and IMS event latencies that can be the cause of poor performance.
• Investigate the type of Db2 activity undertaken by IMS transactions.
• Review update activity against Db2 databases.
• Identify the Db2 URID and LUWID tokens associated with an IMS transaction, then use this information to investigate the problem further with tools like IBM Db2 Log Analysis Tool for z/OS.

IBM MQ support

IMS Problem Investigator can be used to process the IBM MQ log. Use IMS Problem Investigator to analyze and track IMS and MQ events for individual IMS transactions by merging their respective logs. This allows you to measure transaction event latencies and to investigate performance or application problems when IMS transactions use MQ. IMS Problem Investigator uses an extract of the native MQ log using the MQ log print utility CSQ1LOGP.

When merged with the IMS log file, MQ and IMS events associated with an IMS transaction can be viewed together in a single diagnostic session. Merging MQ with IMS log data will allow you to perform the following functions:

• Track both IMS and MQ events that are associated with an IMS transaction, to help determine whether MQ is the cause of a problem in IMS.
• Measure MQ and IMS event latencies that can be the cause of poor performance.
• Investigate the type of MQ activity that was undertaken by IMS transactions.
• Review messages put onto a queue, including their message descriptors and text.
For transactions that use both Db2 and MQ, the three IMS, Db2, and MQ logs can be merged to provide a complete picture of transaction activity.

SMF: IRLM Long Lock support

IMS Problem Investigator can be used to report the SMF 79.15 (X'4F0F') record for IRLM Long Locks. Typically two records are created for each Long Lock – a Waiter and a Blocker, although there can be more than one of each. Long Lock events in a single IMS transaction can be reported when merging IMS and SMF log files. This allows you to measure transaction event latencies and to investigate performance problems when IMS transactions experience IRLM Long Locks.

Summary

Using the dialog or batch reporting, you can use IMS Problem Investigator to merge IMS log data with the logs from related systems. Once merged, track the activity of a single transaction as it progresses through IMS into related systems.

Identifying IMS problems using the TCP/IP characteristics of a transaction

IMS Performance Analyzer can generate an IMS Connect Transaction Index from IMS Connect Extensions journals. Use the IMS Connect Transaction Index with IMS Problem Investigator to identify IMS problems when all you know about the problem is its TCP/IP characteristics.

Features used in this scenario

- **IMS Connect Extensions**
  - Event collection via IMS Connect Extensions journal

- **IMS Performance Analyzer**
  - Creating an IMS Connect Transaction Index using the IMS Connect Extensions journal

- **IMS Problem Investigator**
  - Merging the IMS Connect Transaction Index with the IMS log
  - Finding the problem transaction and then tracking all other IMS records associated with the transaction
  - Isolating the problem within IMS

Scenario description

Suppose a TCP/IP client reports a problem. Sometimes, you may not know enough about the downstream transaction to help you locate the problem using traditional tools. For example, what if all you know is the IP address, the approximate time of the problem, and the nature of the problem (say, “long delay”)? Using only the IMS log, and with only limited details of the problem transaction, pinpointing the transaction can be difficult, let alone an examination of the underlying cause. To help address this challenge, IMS Performance Solution Pack allows you to generate an IMS Connect Transaction Index that you can use to identify transactions in IMS.

1. Use **IMS Performance Analyzer** to generate the IMS Connect Transaction Index.
The IMS Connect Transaction Index is generated by IMS Performance Analyzer from IMS Connect Extensions journals. It collates all the information that can be known about the transaction from the available IMS Connect Extensions journal records. This information may include the client ID, IP address, overall performance, timings of significant events, IMS Connect exit specific performance, and dozens of additional pieces of information. You can use the IMS Connect Transaction Index as both a reduced form of the IMS Connect Extensions journal and as an input to IMS Problem Investigator and IMS Performance Analyzer.

2. Use **IMS Problem Investigator** to perform the following tasks:
   a. Merge the IMS Connect Transaction Index with the IMS log.

   The following figure shows an IMS Connect Transaction Index merged with an IMS log in IMS Problem Investigator.
It is difficult to know exactly where the problem transaction has occurred by simply looking at the merged log. However, we can filter the IMS Connect Transaction Index records to identify only those transactions matching the client’s characteristics and then use tracking to pickup information from IMS about that specific transaction.

b. Filter transactions using an IMS Connect Transaction Index.

The following figure shows a filter for the IMS Connect Transaction Index.

Figure 16. IMS Problem Investigator: Merged view of an IMS log with an IMS Connect Transaction Index
The following figure shows a possible result of this filtering. In this case, we can see a record of the problem transaction, its overall performance and other key indicators.

Figure 17. IMS Problem Investigator: A filter that displays slow transactions from a specific IP address

The following figure shows a possible result of this filtering. In this case, we can see a record of the problem transaction, its overall performance and other key indicators.

Figure 18. IMS Problem Investigator: Tracking a slow IMS Connect transaction

c. Track the problem transaction. As shown in the following figure, tracking (line action TX) reveals all the IMS logs associated with the TCP/IP transaction. We can use the elapsed time view (on the right-hand side) to identify significant timing delays and then drill down to the individual records for further investigation.
In this example, IMS Problem Investigator has revealed a large elapsed time for the 03 record.

**Summary**

The result of using a combination of tools provided in the IMS Performance Solution Pack is that we have a much clearer picture of exactly when the problem occurred, how it progressed, and where it was delayed in IMS.

---

**Analyzing IMS Connect transaction timeouts**

This scenario explains how to diagnose timeouts in IMS Connect using IMS Connect Extensions, IMS Problem Investigator, and IMS Performance Analyzer.

**Features used in this scenario**

- **IMS Connect Extensions**
  - Event collection via IMS Connect Extensions journal

- **IMS Performance Analyzer**
  - Forms-based reporting

- **IMS Problem Investigator**
  - Transaction tracking
  - Elapsed time view

**Scenario description**

You are interested in analyzing IMS Connect transactions that have timed out.

1. Use **IMS Performance Analyzer** to create a Forms-based report that lists all the IMS Connect transaction timeouts:

![IMS Problem Investigator: Identifying the cause of a slow IMS Connect transaction](image-url)
a. Create a List Report Form that includes IMS and IMS Connect fields.

```
EDIT List Report Form - TIMEOUT
Command ===> Scroll ===> PAGE
Description . . . Transaction Timeout Report Page Width . . . 132
            Precision . . . 6
Digit Grouping  SEC
Field / Name + Func Len Description
   STARTCON TIME 15 Connect transaction start time
   TIMEOUT       4 Transaction timeout indicator
   TIMERV       8 Transaction timer value
   ORIGDS       8 Original datastore
   TARGDS       8 Target datastore
   TRANCODE      8 Transaction Code
   RESPON       8 Connect response time
   EOR

******************************* Bottom of data ********************************
```

Figure 20. IMS Performance Analyzer: Summary Report Form for IMS Connect transaction timeouts

b. Create a new IMS Connect Report Set containing a Forms-based Transaction Transit List report. Specify the name of your new Report Form in the Form field.

```
TIMEOUT - Transit List
Command ===> More: < >
Specify required view: Report Interval
2. Extract From
3. Transit options To

Reports Required:
Type Form + Output Messages Precision Digit Match Report
1. REPORT TIMEOUT NO 6 SEC NO 65 <
2. ________ NO 3 NO NO
3. ________ NO 3 NO NO
4. ________ NO 3 NO NO
5. ________ NO 3 NO NO

Selection Criteria:
Object Type Inc/Exc Object + List Validation Warning
Transaction Code _______ _______ -
LTERM _______ _______ -
User ID _______ _______ -
Datastore (IMS ID) _______ _______ -
Client ID _______ _______ -
TCP/IP Port Number _______ _______ -

Figure 21. IMS Performance Analyzer: Transaction Transit List report for the TIMEOUT Report Form
```

c. Run the list report. A transaction that has timed out is displayed with a T in the Time Out column.
In a similar fashion, create a summary Report Form, and generate a Forms-based Transaction Transit Summary report based on that Report Form.

Figure 22. IMS Performance Analyzer: List of all transaction showing ones that timed out with a T

<table>
<thead>
<tr>
<th>CON Tran Start</th>
<th>Time</th>
<th>Transact Out</th>
<th>Timer</th>
<th>Datastor Original</th>
<th>Target</th>
<th>Transact</th>
<th>Tranocode</th>
<th>CON Resp Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.22.05.775464</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>CEXTNONC</td>
<td>0.014497</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.22.05.829208</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>CEXSNONC</td>
<td>88.88059</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.23.34.730098</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>CEXSNONC</td>
<td>88.88073</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.25.03.632108</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>CEXSNONC</td>
<td>0.018865</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.25.03.670884</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>CEXSNONC</td>
<td>0.009048</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.25.08.627165</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTCV</td>
<td>0.020032</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.25.08.647469</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTCV</td>
<td>0.019326</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.25.08.667062</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTCV</td>
<td>0.007806</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.25.08.675089</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTCV</td>
<td>0.010479</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.25.08.685884</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTCV</td>
<td>0.009311</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.25.08.695578</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTCV</td>
<td>0.007857</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.25.08.703730</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTCV</td>
<td>0.272139</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.28.12.910925</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTFM</td>
<td>0.000967</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.28.12.934746</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTFM</td>
<td>0.001005</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.30.39.537522</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTNO</td>
<td>23.37174</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.31.02.695754</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTNO</td>
<td>0.285721</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.31.02.758075</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTNO</td>
<td>0.269912</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.31.02.810101</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTNO</td>
<td>0.508239</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.31.03.085980</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTNO</td>
<td>0.258614</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.31.03.112666</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTNO</td>
<td>0.258371</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.31.03.144002</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTNO</td>
<td>0.257708</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09.31.03.171137</td>
<td>0.250000</td>
<td>ICDE</td>
<td>ICDE</td>
<td>IVTNO</td>
<td>0.260016</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
e. Create an IMS Transaction Index and an IMS Connect Transaction Index. These will be used in the following steps.

2. Use IMS Problem Investigator to perform the following tasks:
   a. Create a filter with conditions to select all CEXSNONC, CEXTNONC, and IVTNO transactions that ran over 250 milliseconds.

---

**Figure 23. IMS Performance Analyzer: Summary of all transactions showing ones that timed out with a T**

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**Figure 24. IMS Problem Investigator: Creating a filter**

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b. Merge the IMS logs, IMS Transaction Index, IMS Connect Transaction Index, and **IMS Connect Extensions** journal, and then apply the new TIMEOUT filter.
c. Use line action TX to perform transaction tracking on one of the IVTNO events (for example, the event at 09.31.02.695754), and then switch to relative time with line action R.

The following example reveals a jump in relative time at log code 0045 OTMA Time-out.

Figure 27. IMS Problem Investigator: Displaying all IVTNO transactions that had an elapsed time of greater than 250 milliseconds
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Date</th>
<th>Time (Relative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0008</td>
<td>Application Start TranCode=IVTNO Region=0003</td>
<td>09.31.02.597281</td>
<td></td>
</tr>
<tr>
<td>5050</td>
<td>Database ISRT Database=IVPDB1 Region=0003</td>
<td>+0.115744.851</td>
<td></td>
</tr>
<tr>
<td>5050</td>
<td>Database ISRT Database=IVPDB1 Region=0003</td>
<td>+0.115762.888</td>
<td></td>
</tr>
<tr>
<td>5050</td>
<td>Database ISRT Database=IVPDB1 Region=0003</td>
<td>+0.115766.796</td>
<td></td>
</tr>
<tr>
<td>5050</td>
<td>Database ISRT Database=IVPDB1 Region=0003</td>
<td>+0.115769.722</td>
<td></td>
</tr>
<tr>
<td>5052</td>
<td>Database insert into KSDB Database=IVPDBII Region=0003</td>
<td>+0.127176.891</td>
<td></td>
</tr>
<tr>
<td>5050</td>
<td>Database ISRT Database=IVPDBII Region=0003</td>
<td>+0.127201.339</td>
<td></td>
</tr>
<tr>
<td>5610</td>
<td>Syncpoint Start of Phase 1 Region=0003</td>
<td>+0.127272.062</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>Output Message Response LTerm=IPIINO12 Source=Connect</td>
<td>+0.128116.146</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Output Message Enqueue LTerm=IPIINO12 Region=0003</td>
<td>+0.128124.228</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Free Message</td>
<td>+0.128134.173</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Free Message</td>
<td>+0.128453.383</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Free Message</td>
<td>+0.128453.383</td>
<td></td>
</tr>
<tr>
<td>0042</td>
<td>Message received from OTMA Type=Data</td>
<td>+0.131870.316</td>
<td></td>
</tr>
<tr>
<td>003D</td>
<td>Message Exit called for XMIT</td>
<td>+0.131870.316</td>
<td></td>
</tr>
<tr>
<td>0008</td>
<td>Application Start TranCode=IVTNO Region=0003</td>
<td>+0.131870.316</td>
<td></td>
</tr>
<tr>
<td>5050</td>
<td>Database ISRT Database=IVPDB1 Region=0003</td>
<td>+0.131870.316</td>
<td></td>
</tr>
<tr>
<td>5612</td>
<td>Syncpoint End of Phase 2 Program=DFSIVP1 Region=0003</td>
<td>+0.131870.316</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>Output Message Response LTerm=IPIINO12 Source=Connect</td>
<td>+0.132116.146</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Output Message Enqueue LTerm=IPIINO12 Region=0003</td>
<td>+0.132124.228</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Free Message</td>
<td>+0.132134.173</td>
<td></td>
</tr>
<tr>
<td>0042</td>
<td>Message received from OTMA Type=Data</td>
<td>+0.133046.858</td>
<td></td>
</tr>
<tr>
<td>003D</td>
<td>Message Exit called for XMIT</td>
<td>+0.133046.858</td>
<td></td>
</tr>
<tr>
<td>0008</td>
<td>Application Start TranCode=IVTNO Region=0003</td>
<td>+0.133046.858</td>
<td></td>
</tr>
<tr>
<td>5050</td>
<td>Database ISRT Database=IVPDB1 Region=0003</td>
<td>+0.133046.858</td>
<td></td>
</tr>
<tr>
<td>5612</td>
<td>Syncpoint End of Phase 2 Program=DFSIVP1 Region=0003</td>
<td>+0.133046.858</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>Output Message Response LTerm=IPIINO12 Source=Connect</td>
<td>+0.133062.526</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Output Message Enqueue LTerm=IPIINO12 Region=0003</td>
<td>+0.133074.492</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Free Message</td>
<td>+0.133086.772</td>
<td></td>
</tr>
<tr>
<td>0048</td>
<td>Trigger Event for CLOSE</td>
<td>+0.133991.236</td>
<td></td>
</tr>
<tr>
<td>07</td>
<td>Application Terminate TranCode=IVTNO Region=0003</td>
<td>+0.167916.114</td>
<td></td>
</tr>
<tr>
<td>0045</td>
<td>OTMA Time-out</td>
<td>+0.384012.647</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 28. IMS Problem Investigator: Tracking an IVTNO transaction**
Analyzing IMS-to-IMS TCP/IP connections

IMS-to-IMS TCP/IP connectivity improves the ability of enterprises to deliver integrated solutions with reduced network complexity. These connection models offer new challenges for performance management and tuning. The IMS Performance Solution Pack helps address these challenges.

IMS Performance Solution Pack supports IMS-to-IMS TCP/IP connections in the following ways:

**IMS Connect Extensions**
Records IMS-to-IMS requests as they pass through IMS Connect. Requests are recorded in the IMS Connect Extensions journal.

**IMS Problem Investigator**
 Presents, formats, and collates these requests, both from across IMS Connect and IMS, and from across IMS systems.

Analyzing Open Database transactions

The Open Database solution provides direct, distributed TCP/IP access to IMS data, both within an IMSplex or with platforms other than System z®. IMS Performance Solution Pack helps provide detailed analytics of Open Database transactions.

Open Database overview

The IMS Open Database solution provides a standards-based direct interface (Java™ EE and JDBC) to IMS data from TCP/IP-enabled Windows, Linux, HP-UX, Sun Solaris, AIX®, Linux on System z (zLinux), and z/OS platforms.

It simplifies the management of connections through the Open Database Access (ODBA) interface, and uses IMS Connect for network connectivity and security authentication. Applications can access IMS databases across LPAR boundaries, extending the reach and impact of your IMS assets.

The Open Database solution requires a Common Service Layer (CSL) component called Open Database Manager (ODBM). ODBM provides an interface for programs that access IMS databases from many different distributed and local environments (ODBA). It also provides routing of incoming requests and can act as a resource manager (if required).

Relationship of Open Database access to IMS Connect

IMS Connect provides the TCP/IP access layer to ODBM. Incoming Open Database requests are identified and an appropriate target ODBM is selected.

The role of IMS Connect is to provide the TCP/IP layer, routing to ODBM, and security authentication.

From the perspective of distributed client applications, IMS Connect is the primary gateway for Open Database.

Protocols used to make Open Database requests

Open Database uses the Distributed Relational Database Architecture™ (DRDA) protocol, an open standards based protocol for distributed database access used by Db2 and other enterprise databases.
DRDA defines request and reply sequences and the distributed data management (DDM) object data structure. The DRDA protocol itself is managed by The Open Group. The major differentiator for DRDA is that it is standards-based, well established in application environments, and is extensible.

IMS uses standard DRDA code points as well as custom DDM objects. The IMS Performance Solution Pack records the DRDA requests, and can format and interpret both standard DRDA and the IMS extensions.

**Support for Open Database development and Open Database maintenance**

IMS Performance Solution Pack provides extensive support for Open Database development and maintenance.

**IMS Connect Extensions**

- Records Open Database requests as they pass through IMS Connect.
- Provides enhanced routing and load balancing for Open Database.
- Allows you to secure Open Database access to specific IMS Connect systems, client IP addresses, and ports.

IMS Connect Extensions events provide detailed information about the content of Open Database requests and replies and their sequence of execution. This information can be used to record the sequences and log errors. The information also provides important framing information that help identify request times and bottlenecks.

**IMS Problem Investigator**

- Provides an easy-to-read, interactive view of requests and reply sequences.
- Interprets DRDA sequences.
- Formats DLI calls that are generated from Open Database SQL queries.
- Shows DLI call results, including I/O and feedback areas.
- Highlights patterns that may signify problems such as non-allocation of PSBs.
- Provides an end-to-end picture by combining the information logged in IMS Connect with the information logged in IMS.

**Customized reports using Report Forms**

Use IMS Performance Analyzer report forms to create a range of customized reports to suit your performance reporting requirements.

**Features used in this scenario**

**IMS Performance Analyzer**

- Form-based reporting with customized report forms

**Scenario description**

You are interested in creating a customized performance report. To do this, use IMS Performance Analyzer form-based reporting and a report form:

1. Create a report form that includes the report fields you are interested in. Fields appear as column headings in your report output.
3. Run the report.

IMS Performance Analyzer contains several report form samples. You can use these samples directly in a form-based Transaction Transit list or summary report, or you can use them to create your own.

**Example forms**

**CPU heavy hitters**

The following example demonstrates a form that summarizes CPU-intensive transactions by program name:

```
EDIT Summary Report Form - CPUHEAVY Row 1 of 14 More: < >
Command ===> ________________________ Scroll ===> PAGE

Description . . . CPU heavy hitters Page Width . . . 132
               Precision . . . 6
Digit Grouping SEC

Field   Sort / Name +  K  O  Func  Len Description
    __    __ /   ___ +_ --_ _ __ _    __ __  ____________
   PROGRAM   K  A    8  Program or PSB name
  TRANCNT    10  Transaction count
  CPU TIME   D  TOTAL  8  CPU time
  CPU TIME   —   AVE  8  CPU time
  CPU TIME   —   RANGE  8  CPU time
  CPU TIME   —   RANGE  8  CPU time
  CPU TIME   —   RANGE  8  CPU time
  CPU TIME   —   MAX  8  CPU time
  PROCESS   —   AVE  8  Processing time
  PROCESS   —   RANGE  8  Processing time
  PROCESS   —   RANGE  8  Processing time
  PROCESS   —   MAX  8  Processing time
  EOX       —       — 8                    End of Extract                      
  EOR       —       — 8                    End of Report                       
******************************************************************************
```

*Figure 29. IMS Performance Analyzer: A Summary Report Form showing CPU-intensive transactions by program name*

**BMP reporting**

The following examples demonstrate customized BMP reporting using report forms:
List Report Form - BMPCHKPT

Description . . . List BMP Checkpoint Detail
Page Width . . . 132
Precision . . . 6
Digit Grouping SEC

Field
/ Name + Func Len Description
STARTCON TIME 15 Connect transaction start time
PROGRAM 8 Program or PSB name
BMPCHKID 8 BMP user checkpoint id
STARTIMS TIME 15 IMS transaction arrival time
CPUTIME 8 CPU time
PROCESS 8 Processing time
DBGETS 10 DB get call count
DBUPDATS 10 DB update call count
FPGETS 10 Fast Path DB get call count
EOR ----------------- End of Report ------------------
EOX ----------------- End of Extract ------------------

*************** Bottom of data ***************

Figure 30. IMS Performance Analyzer: A List Report Form showing BMP processing between checkpoint intervals

List Report Form - BMPCPDBD

Description . . . BMP JOB Checkpoint by DBD
Page Width . . . 132
Precision . . . 6
Digit Grouping SEC

Field
/ Name + Func Len Description
JOBNAME 8 Region Jobname
PROGRAM 8 Program or PSB name
BMPCHKID 8 BMP user checkpoint id
STARTIMS TIME 15 IMS transaction arrival time
DATABASE 8 Database DBD name
DBACMETH 4 Database Access Method
EOR ----------------- End of Report ------------------
EOX ----------------- End of Extract ------------------

*************** Bottom of data ***************

Figure 31. IMS Performance Analyzer: A List Report Form showing BMP checkpoint by DBD
**Figure 32. IMS Performance Analyzer: A Summary Report Form showing BMP detail**

**Figure 33. IMS Performance Analyzer: A Summary Report Form showing BMP execution and locking statistics**
Migrating from previous releases

If you already have one or more of the products that are included in IMS Performance Solution Pack installed on your system, you might need to migrate those products to the new environment.

About this task

IBM IMS Performance Solution Pack for z/OS, V2.2 is supplied with the following products:

- IBM IMS Connect Extensions for z/OS, V3.1
- IBM IMS Performance Analyzer for z/OS, V4.4
- IBM IMS Problem Investigator for z/OS, V2.5

The individual products delivered with IMS Performance Solution Pack are compatible with previous releases supported by IBM Support. However, only if you upgrade all three to the current level will you obtain full benefit of the cross-product features of the pack.

Upgrading each component product is designed to be seamless. It involves a few simple customization steps to use the new product libraries and existing system definitions and control data sets which are automatically upgraded if required.

Procedure

1. For detailed information and considerations when upgrading each product, refer to the “Upgrading” topics in the individual product user’s guides. See “Product publications” on page 9 for further details.
2. Follow the installation and customization steps in “Installing IMS Performance Solution Pack” on page 45, applying all current maintenance.
3. For each component product, the primary migration considerations are:
   a. Customize the ISPF product dialog startup procedures to use the new product libraries.
   b. Ensure the dialog profile settings (primary menu option 0.1) are updated to use the new product libraries, especially the new load library.
   c. Ensure the dialog profile settings are setup to either share system definitions between the products, or run independently according to your particular operational requirements.
   d. All objects, such as Filters and Report Forms, created in previous releases of the component products are upwardly compatible and automatically converted, where required, when new or changed function is first accessed by the dialog.
   e. Compare the new JCL samples and procedures with those already in use, so you can modify as required to reflect any changes or enhancements.
4. Optional: Setup IMS Tools Knowledge Base (ITKB) as a repository for selected IMS Performance Analyzer log reports. Specify the data set name of the ITKB load library in the IMS Performance Analyzer profile settings. Then edit and run the IMS Performance Analyzer sample job IPIDITKB.
Customizing IMS Performance Solution Pack

The following topics describe how to install and customize IMS Performance Solution Pack.

Topics:

- “Installing IMS Performance Solution Pack”
- “Verifying your installation” on page 47

Installing IMS Performance Solution Pack

Before the complete functionality of IMS Performance Solution Pack is available, all three performance tools must be installed and customized.

About this task

Although supplied as one complete pack, each component product is installed independently. You can choose to operate them independently, but to achieve the full functional benefit, you need to establish the interrelationships by following the few simple steps outlined here.

The following checklist is intended to assist you in the installation, but is not intended to be a comprehensive set of instructions. The user’s guides for each product provide detailed installation and customization instructions, plus explanations of messages and codes that you might encounter during the process. See “Product publications” on page 9 for further details.

Complete information about installation requirements, prerequisites, and procedures for IMS Performance Solution Pack is located in the Program Directory for IBM IMS Performance Solution Pack for z/OS, GI13-4905.

Procedure

1. Install IBM Common Services Library for z/OS (5655-CSL).
3. Install all current maintenance for the component products. This ensures that all new functions are available.
4. APF-authorize the IMS Connect Extensions and functional support LINK libraries. Only IMS Connect Extensions has online, real-time operation. It runs in the IMS Connect address space.
5. Optional: Install the IMS Connect Extensions Operations Console.
   The Operations Console is an Eclipse-based PC application that provides a graphical interface to perform IMS Connect Extensions operations. It allows you to monitor and control IMS Connect systems and their components and active sessions from a distributed workstation. See “Product publications” on page 9 and refer to the IMS Connect Extensions User’s Guide for further details.
6. Install the ISPF-based dialog of each component product by following the procedure described in each user’s guide.
7. Verify that the correct Load Library is specified in the dialog profile settings (primary menu option 0.1) for each IMS Performance Solution Pack component product.

8. Compare all new JCL and procedures with those currently in use. This ensures that all changes or enhancements might have been made to the JCL samples that are included.

9. Optional: Set up shared System Definitions between IMS Performance Analyzer and IMS Problem Investigator. This allows you to maintain your systems, groups (sysplexes), and file definitions from either product, and changes in one will be reflected in the other.

   To achieve this, specify the same data set name for both of the following libraries in the dialog profile settings primary menu option 0.1 IMS PA Profile Library in IMS Problem Investigator and the Permanent ISPF Table Library in IMS Performance Analyzer.

   **Note:** If IMS Problem Investigator detects that you have IMS Performance Analyzer installed, your IMS PA Profile Library is automatically set. If you do not specify an IMS PA Profile Library, your IMS Problem Investigator System Definitions will be saved in your IMS PI Personal Profile Library.

10. Optional: Set up IMS Performance Analyzer and IMS Problem Investigator to use IMS Connect system and journal file definitions in IMS Connect Extensions. To achieve this, specify the data set name of the default IMS Connect Extensions repository in the dialog profile settings of both the other products.

11. Optional: If you want to offload IMS Performance Analyzer reports, install the IMS Tools Knowledge Base from the IBM Tools Base for z/OS.

    To perform the SMP/E installation, see the Program Directory for IBM Tools Base for z/OS, GI10-8819. This process allocates and downloads the target and distribution libraries and performs the SMP/E installation. See the IBM Tools Base IMS Tools Knowledge Base for z/OS User’s Guide for further details.

12. Optional: Set up IMS Tools Knowledge Base as a repository for selected IMS Performance Analyzer log reports:

    a. Specify the data set name of the IMS Tools Knowledge Base (ITKB) load library in the IMS Performance Analyzer profile settings.

    b. Edit and run the IMS Performance Analyzer sample job IPIDITKB.

13. Verify the installation. See "Verifying your installation" on page 47 for further details.

### Data sets for IMS Performance Solution Pack

Install IMS Performance Solution Pack by installing each of the component products.

Complete information about installation requirements, prerequisites, and procedures for IMS Performance Solution Pack is located in the Program Directory for IBM IMS Performance Solution Pack for z/OS, GI13-4905.

The component products are shipped in separate libraries. The following table lists the data sets distributed in IMS Performance Solution Pack.

**Note:** Load module library SFUNLINK is supplied with IBM Common Services Library for z/OS (5655-CSL).
Table 2. Data sets for IMS Performance Solution Pack V2.2

<table>
<thead>
<tr>
<th>Type</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA</td>
<td>SCEZGENU</td>
<td>IMS Connect Extensions Operations Console</td>
</tr>
<tr>
<td>EXEC</td>
<td>SCEXEXEC</td>
<td>REXX execs for IMS Connect Extensions</td>
</tr>
<tr>
<td></td>
<td>SIPIEXEC</td>
<td>REXX execs for IMS Performance Analyzer</td>
</tr>
<tr>
<td></td>
<td>SALZEXEC</td>
<td>REXX execs for IMS Problem Investigator</td>
</tr>
<tr>
<td>LMOD</td>
<td>SCEXLINK</td>
<td>Executable Load Library for IMS Connect Extensions</td>
</tr>
<tr>
<td></td>
<td>SFUNLINK</td>
<td>IBM Common Services Library for z/OS (5655-CSL) load module library for IMS</td>
</tr>
<tr>
<td></td>
<td>SIPILINK</td>
<td>Executable Load Library for IMS Performance Analyzer</td>
</tr>
<tr>
<td></td>
<td>SALZLINK</td>
<td>Executable Load Library for IMS Problem Investigator</td>
</tr>
<tr>
<td>MACRO</td>
<td>SCEXMACS</td>
<td>Distributed product macros for IMS Connect Extensions</td>
</tr>
<tr>
<td></td>
<td>SIPIMAC</td>
<td>Distributed product macros for IMS Performance Analyzer</td>
</tr>
<tr>
<td>MESSAGE</td>
<td>SCEXMENU</td>
<td>ISPF messages for IMS Connect Extensions</td>
</tr>
<tr>
<td></td>
<td>SIPIMENU</td>
<td>ISPF messages for IMS Performance Analyzer</td>
</tr>
<tr>
<td></td>
<td>SALZMENU</td>
<td>ISPF messages for IMS Problem Investigator</td>
</tr>
<tr>
<td>PANEL</td>
<td>SCEXPENU</td>
<td>ISPF panels for IMS Connect Extensions</td>
</tr>
<tr>
<td></td>
<td>SIPIPENU</td>
<td>ISPF panels for IMS Performance Analyzer</td>
</tr>
<tr>
<td></td>
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<td>ISPF panels for IMS Problem Investigator</td>
</tr>
<tr>
<td>SAMPLE</td>
<td>SCEXBASE</td>
<td>SMP/E JCL members for installing IMS Connect Extensions</td>
</tr>
<tr>
<td></td>
<td>SIPIBASE</td>
<td>SMP/E JCL members for installing IMS Performance Analyzer</td>
</tr>
<tr>
<td></td>
<td>SALZBASE</td>
<td>SMP/E JCL members for installing IMS Problem Investigator</td>
</tr>
<tr>
<td></td>
<td>SFUNBASE</td>
<td>SMP/E JCL members for installing Common Services Library server</td>
</tr>
<tr>
<td></td>
<td>SCEXSAMP</td>
<td>Sample JCL members, IVP utilities and automated configuration scripts for IMS</td>
</tr>
<tr>
<td></td>
<td>SIPISAMP</td>
<td>Sample JCL members for IMS Performance Analyzer</td>
</tr>
<tr>
<td></td>
<td>SALZSAMP</td>
<td>Sample JCL members and REXX execs for IMS Problem Investigator</td>
</tr>
<tr>
<td></td>
<td>SFUNSAMP</td>
<td>Sample JCL members for Common Services Library server</td>
</tr>
<tr>
<td>SKEL</td>
<td>SCEXSENU</td>
<td>ISPF skeleton JCL members for IMS Connect Extensions</td>
</tr>
<tr>
<td></td>
<td>SIPISENU</td>
<td>ISPF skeleton JCL members for IMS Performance Analyzer</td>
</tr>
<tr>
<td></td>
<td>SALZSENU</td>
<td>ISPF skeleton JCL members for IMS Problem Investigator</td>
</tr>
<tr>
<td>TABLE</td>
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<td>ISPF tables for IMS Connect Extensions</td>
</tr>
<tr>
<td></td>
<td>SIPITENU</td>
<td>ISPF tables for IMS Performance Analyzer</td>
</tr>
<tr>
<td></td>
<td>SALZTENU</td>
<td>ISPF tables for IMS Problem Investigator</td>
</tr>
</tbody>
</table>

Verifying your installation

After installing IMS Performance Solution Pack, verify that you have installed it correctly by running the installation verification procedure (IVP) for each component product.

Procedure

1. Run the “IMS Connect Extensions IVP” on page 48.
2. Run the “IMS Performance Analyzer IVP” on page 48.
3. Run the "IMS Problem Investigator IVP" on page 49.

What to do next

After you verify that all components of IMS Performance Solution Pack have been installed and configured correctly, you can begin to use it to help you analyze and resolve performance problems with your IMS applications, and monitor and tune your IMS system operations.

IMS Connect Extensions IVP

The installation verification procedures (IVP) generate test sessions to verify the installation of IMS Connect and IMS Connect Extensions.

Procedure

Follow the instructions in the IMS Connect Extensions User’s Guide to:

1. Modify the IMS Connect startup job to start IMS Connect with IMS Connect Extensions.
2. View the system and its activity through the IMS Connect Extensions ISPF dialog.
3. Customize and run the sample IVP jobs.

IMS Performance Analyzer IVP

The installation verification procedure (IVP) for IMS Performance Analyzer exercises the batch and dialog installations.

IMS PA: Verifying batch installation

Use this method to verify the installation of the batch components of IMS Performance Analyzer.

About this task

The IMS Performance Analyzer batch utility can generate reports, extracts or CSV files. The following steps will verify IMS log reporting.

Procedure

1. Edit the sample JCL member IPIIVP supplied in the SIPISAMP library. Insert the placeholders for <vrm>, <IPI.V4R4M0.SIPILINK>, and <input.log> (an input log file), then submit the job.
2. Review the messages in SYSPRINT.
3. Review the log record output.

IMS PA: Verifying dialog installation

Use this method to verify the installation of the dialog components of IMS Performance Analyzer.

About this task

The guided tour in the IMS Performance Analyzer User’s Guide provides additional detail on the following steps.
Procedure
1. Set up your IMS PA environment:
   a. Specify your IMS PA profile settings.
   b. Define an IMS subsystem to report on.
2. Request a Log report.
3. Create a Report Form.
4. Request a Forms-based Log report.

IMS Problem Investigator IVP
The installation verification procedure (IVP) for IMS Problem Investigator exercises the batch and dialog installations.

IMS PI: Verifying batch installation
Use this method to verify the installation of the batch components of IMS Problem Investigator.

About this task
The IMS PI batch utility can generate reports, produce an extract of selected records from the log, or create a CSV file of selected log record fields. The following steps will verify IMS log reporting.

Procedure
1. Edit the sample JCL member ALZIVP supplied in the SALZSAMP library. Insert the placeholders for <vrm>, <ALZ.V2R5M0.SALZLINK>, and <input.log> (an input log file), then submit the job.
2. Review the messages in SYSPRINT. Expect return code 4 if message ALZ0010W is issued (because LOGRPT page limit reached for a large log file).
3. Review the log record output in ddname LOGRPT. Log records are formatted in the same way as the dialog.
4. If IMS log records are processed, a Log Information report will also be output with ddname LOGINFO.

IMS PI: Verifying dialog installation
Use this method to verify the installation of the dialog components of IMS Problem Investigator.

About this task
The ISPF dialog is used to investigate log files. The following steps verify basic log file processing.

Procedure
1. From the ISPF Primary Option Menu, select option 6 Command, and run the following command:
   EXEC 'ALZ.V2R5M0.SALZEXEC(ALZOREXX) ' 'ALZ.V2R5M0'
2. From the IMS Problem Investigator Primary Option Menu, select option 1 Process.
3. Specify the IMS Release and add a Log File data set name in the process list, then select it.
4. Review the log file contents. Scroll up and down, left and right, then select a record to view its contents.

Figure 34. IMS Problem Investigator installation verification: Dialog
Troubleshooting

Use these topics to diagnose and correct problems that you experience with IMS Performance Solution Pack.

The batch processor issues messages with a unique message identifier followed by the message text. The message identifier has one of the following formats where nnnn is a four-digit message identification number and \( x \) is a letter that indicates the severity:

\( \text{ALZ}nnnnx \)
IMS Problem Investigator product message

\( \text{CEX}nnnnx \)
IMS Connect Extensions product message

\( \text{FUN}nnnnx \)
IBM Common Services Library support message

\( \text{IPI}nnnnx \)
IMS Performance Analyzer product message

For an explanation of the messages, refer to the corresponding product's user guide. See “Product publications” on page 9.

Topics:
- "How to look up message explanations"
- "Gathering diagnostic information" on page 52

How to look up message explanations

You can use several methods to search for messages and codes.

Searching Knowledge Center

In the search box that is located in the top, enter the number of the message that you want to locate. For example, you can enter DFS1065A in the search field.

Use the following tips to help you improve your message searches:
- You can search for information on codes by entering the code; for example, enter -327.
- Enter the complete or partial message number. You can use the asterisk wildcard character (*) to represent multiple characters, and you can use the question mark wildcard character (?) to represent a single character.

The Knowledge Center contains the latest message information for all of the information management products that are included in the Knowledge Center.

Searching for messages on the Web

You can use any of the popular search engines that are available on the Web to search for message explanations. When you type the specific message number or code into the search engine, you will be presented with links to the message information in IBM Knowledge Center.
Gathering diagnostic information

Before you report a problem with IMS Performance Solution Pack to IBM Software Support, you need to gather the appropriate diagnostic information.

Procedure

Provide the following information for all IMS Performance Solution Pack problems:

- A clear description of the problem and the steps that are required to re-create the problem
- All messages that were issued as a result of the problem
- Product release number and the number of the last program temporary fix (PTF) that was installed
- The version of Db2/IMS that you are using and the type and version of the operating system that you are using

Provide additional information based on the type of problem that you experienced:

For online abends, provide the following information

- A screen shot of the panel that you were using when the abend occurred
- The job log from the TSO session that encountered the abend
- The job log from the server
- A description of the task that you were doing before the abend occurred

For errors in batch processing, provide the following information

- The complete job log
- Print output
- Contents of the any data sets that were used during the processing
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