Tivoli

Information Management for z/OS

Diagnosis Guide

Version 7.1

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Preface

This guide provides guidelines and information to help you diagnose and resolve problems related to your use of the Tivoli® Information Management for z/OS licensed program and its applications.

There may be references in this publication to versions of Tivoli Information Management for z/OS's predecessor products. For example:

- TME 10™ Information/Management Version 1.1

- Information/Management Version 6.3, Version 6.2, Version 6.1

- Tivoli Service Desk for OS/390® Version 1.2

Prerequisite and Related Documentation

The library for Tivoli Information Management for z/OS Version 7.1 consists of these publications. For a description of each, see "The Tivoli Information Management for z/OS Library" on page 93.

Tivoli Information Management for z/OS Application Program Interface Guide, SC31-8737-00

Tivoli Information Management for z/OS Client Installation and User's Guide, SC31-8738-00

Tivoli Information Management for z/OS Data Reporting User's Guide, SC31-8739-00

Tivoli Information Management for z/OS Desktop User's Guide, SC31-8740-00

Tivoli Information Management for z/OS Diagnosis Guide, GC31-8741-00

Tivoli Information Management for z/OS Guide to Integrating with Tivoli Applications, SC31-8744-00

Tivoli Information Management for z/OS Integration Facility Guide, SC31-8745-00

Tivoli Information Management for z/OS Licensed Program Specification, GC31-8746-00

Tivoli Information Management for z/OS Master Index, Glossary, and Bibliography, SC31-8747-00

Tivoli Information Management for z/OS Messages and Codes, GC31-8748-00

Tivoli Information Management for z/OS Operation and Maintenance Reference, SC31-8749-00

Tivoli Information Management for z/OS Panel Modification Facility Guide, SC31-8750-00

Tivoli Information Management for z/OS Planning and Installation Guide and Reference, GC31-8751-00

Tivoli Information Management for z/OS Problem, Change, and Configuration Management, SC31-8752-00

Tivoli Information Management for z/OS Program Administration Guide and Reference, SC31-8753-00

Tivoli Information Management for z/OS Reference Summary, SC31-8754-00

Tivoli Information Management for z/OS Terminal Simulator Guide and Reference, SC31-8755-00

Tivoli Information Management for z/OS User's Guide , SC31-8756-00

Tivoli Information Management for z/OS World Wide Web Interface Guide, SC31-8757-00

Note: Tivoli is in the process of changing product names. Products referenced in this manual may still be available under their old names (for example, TME 10 Enterprise Console instead of Tivoli Enterprise Console®).

What This Guide Contains

This guide contains the following sections:

- "Procedures for Diagnosing Problems" on page 1 gives a suggested approach to diagnosing a problem—from defining the problem to actually resolving the problem.

- "Database Architecture" on page 5 describes the content of Tivoli Information Management for z/OS's database and the data sets it contains. This chapter also explains the relationships between these data sets. You need a basic understanding of the database before you begin to analyze problems.

- "System Interfaces" on page 11 describes the interfaces between the Tivoli Information Management for z/OS functions and system control program products, such as ISPF.

- "Analyzing Problem Symptoms" on page 15 explains how to analyze the different symptoms and describes some typical problems and their possible causes.

- "Tools and Procedures for Resolving Problems" on page 37 identifies the tools and procedures that help you determine whether the problem you found is already known or if it is unique. This will help you identify the underlying causes of the problem. This chapter also explains the procedure you should follow to recover your database, in the event it becomes damaged.

- "Contacting Tivoli" on page 53 explains the procedure you should follow when you need to search for an existing problem or report a problem to IBM®.

- "Problem Diagnostic Processes" on page 61 presents diagnostic processes to follow when you are diagnosing many of your Tivoli Information Management for z/OS problems.

- "Collecting Information About Your Problem and System" on page 83 contains a list of pertinent questions that you should answer before attempting to analyze the problem.

How Information Is Presented in This Guide

The panels presented in this guide are not meant to be exact replicas of the way a panel appears on the screen. The information on the panels is correct but the spacing is not always exact.

In the text of this guide, selections on selection or options panels and fields on data-entry panels appear in bold type; for example, the **Return to caller** field. The input you enter in response to the fields on data-entry panels is in all capital letters; for example, Enter CREATE in the **Create/inquiry** field.

Commands, such as END, CONTROL, RESUME, or FIELD, appear in all capital letters in text. Although not commands, the user responses YES and NO also appear in capital letters.

The highlighted print on a panel indicates the selection you are to make; the highlighted print in text is the information you enter or select while performing a task.

Contacting Customer Support

For support inside the United States, for this or any other Tivoli product, contact Tivoli Customer Support in one of the following ways:
- Send e-mail to **support@tivoli.com**
- Call 1-800-TIVOLI8
- Navigate our Web site at **http://www.support.tivoli.com**

For support outside the United States, refer to your Customer Support Handbook for phone numbers in your country. The Customer Support Handbook is available online at **http://www.support.tivoli.com**.

When you contact Tivoli Customer Support, be prepared to provide identification information for your company so that support personnel can assist you more readily.

The latest downloads and fixes can be obtained at **http://www.tivoli.com/infoman**.

1

Procedures for Diagnosing Problems

You are running the Tivoli Information Management for z/OS program and something unusual happens. You have a problem. It could be that the panel you are looking at is not what you expected. It could be that the report you generated did not contain the expected information. You might be stuck in a loop and not know how to get out of it.

When You Find a Problem

The first thing to do when you run into a problem is stop. Second, think about the problem. What kind of modifications have you made to the product recently? Have you modified the panels or report format routines? Maybe these changes are somehow responsible for the error conditions. What changes were made to the operating environment? Have they been tested thoroughly? What task were you doing when the error occurred? What symptoms did you receive? Now is when you need to begin to gather all the information about the problem. With the information you gather, you might be able to determine whether you have a known problem or not.

The Steps Involved

Recording the symptoms that define the problem is the first step in problem solving. Then you are ready for the second step, analyzing the symptom information. For example, certain symptoms might indicate that a data set has been damaged. Analysis of the symptoms helps determine if a data set actually was damaged and if so, which data set was damaged. The third step, problem resolution, consists of determining how to correct the problem and then fixing it.

To help you better understand the diagnosis process, the following scenario takes you through the various steps of analyzing a problem.

Step 1: Define the Problem and Record the Symptoms

While creating a stored response chain (SRC) that updates a change request record to add your privilege class name to the list of approvers, you receive an error message. Before receiving the message, you selected **Approver Data** from panel BLG0CU01 to display panel BLGLAPVR (or panel BLG0C500 if the change record is an older record having change approver data). To enter your privilege class name, you placed the cursor at the input field for item 1 and entered an equals sign (=). This displayed BLG6SP01, which contained message BLG03062I (Record not located).

This message is the primary symptom that alerts you to the problem. However, you cannot adequately determine the reason for the problem using only this information. The message you received is not pertinent to the operation you were performing. Therefore, you need to

identify as many details as possible that led to the problem: the environment and the events that led to the error occurrence. To further understand this particular problem, you need to ask yourself several questions:

- What functions were being used? — You were using SRC GENERATE and UPDATE commands when the failure occurred.

- What records or fields were accessed? — The **Change approver** field for change records.

- What panels were involved? — BLG0CU01, BLGLAPVR (or BLG0C500), and BLG6SP01. (You need to have this information to determine the exact environment, particularly if you suspect a panel has contributed to the problem and if panel modifications have been made.)

To assist you in gathering information, "Collecting Information About Your Problem and System" on page 83 is a list of questions you should answer for each problem you encounter.

Step 2: Analyze the Symptom Information

You can use the information you have gathered to further analyze the problem. You need to determine if the problem is limited to the symptom information obtained so far or involves more. To do this, you can perform several tests:

- Try to update a change record, without running an SRC, and perform the operation that failed. In this example, you would enter the equals sign (=) in the first **Approval class** field on panel BLG0C500. If you can perform this operation successfully, the problem is limited to the SRC generation environment.

- Try to enter the equals sign (=) in other fields on this panel. Does it fail only in the first data-entry field or on the other fields also? This test will help you determine if the problem is related only to panel BLG6SP01 or to other assisted-entry panels as well.

- Try to enter the equals sign (=) in fields other than the **Approver privilege class name** field while in SRC Generate mode. Does it fail when used in any other fields? Does it fail only when used in a field related to a privilege class?

When performing the above tests, you might have found that the problem occurred only when you ran an SRC and the equals sign (=) was used in a field that contains a privilege class name. A check of the assisted-entry panels for each of these fields showed that they all have one thing in common. That is, they each call a program exit, BLG01054, to validate the privilege class name. Because you can verify that the privilege class name represented by the equals sign (=) exists in the database, this indicates that the program exit is not performing correctly when started in SRC Generate mode.

More information is included in "Analyzing Problem Symptoms" on page 15 to assist you in this effort.

Step 3: Resolve the Problem

You can now use all the information you have gathered to resolve the problem. Search your local problem database first to determine if the problem is known at your installation. If the problem is unknown and you have a Tivoli Information Management for z/OS database, search your database for an APAR that documents the problem. If there is no Authorized Program Analysis Report (APAR) written yet, you have gathered enough information to report the problem to Tivoli.

More information to assist you in resolving the problem is included in "Tools and Procedures for Resolving Problems" on page 37. "Contacting Tivoli" on page 53 provides additional information that you might need when contacting Tivoli.

2

Database Architecture

Before you start to diagnose your Tivoli Information Management for z/OS problems, you must have a working knowledge of the Tivoli Information Management for z/OS database architecture. This chapter gives an overview of the Tivoli Information Management for z/OS database, including the structures that make recording and retrieval of data possible.

Tivoli Information Management for z/OS uses a VSAM database as the repository for all information collected through user responses to the panels in the prompting sequences. The database consists of three VSAM data sets:

- Structured description data set (SDDS) (you can have either one or five of these data sets)
- Structured description index data set (SDIDS)
- Structured description log data set (SDLDS).

Centralized Database Services

Tivoli Information Management for z/OS contains one or more central address space database servers that allow a greater number of users to perform tasks simultaneously than previous versions allowed. A central address space is called a BLX Service Provider (BLX-SP).

Tivoli Information Management for z/OS enables users on different BLX-SPs to concurrently share Tivoli Information Management for z/OS VSAM data sets without compromising data integrity. Refer to the section on Multisystem Database Access in *Tivoli Information Management for z/OS Planning and Installation Guide and Reference* for more information.

The BLX-SP provides all input and output needs for all VSAM data sets used by all user address spaces. Centralization of input and output significantly improves performance through the use of VSAM local shared resources (LSRs) defined in the BLX-SP and the elimination of database integrity processing in each user address space.

Because the BLX-SP provides this centralized capability, the BLX-SP must be started before any Tivoli Information Management for z/OS user address space can run. This applies to interactive Tivoli Information Management for z/OS users, any batch Tivoli Information Management for z/OS jobs, utilities, or user application programs using one of the application program interfaces APIs.

Database Overview

Users of Tivoli Information Management for z/OS can be interactive users, batch jobs, or applications that call API transactions. As a user proceeds to enter data, Tivoli Information Management for z/OS collects structured words and prefix words (s-words and p-words, respectively) that correspond to the fields and data being entered. When the user files the record, all data is collected into the SDDS, and the s-words and p-words, which the user requests to be cognized, are collected into the SDIDS.

The SDDS and the SDIDS form the database for the Tivoli Information Management for z/OS product. The records created by Tivoli Information Management for z/OS users are in the SDDS in the form of structured descriptions. The SDDS records are located by cognized keywords stored in the SDIDS.

The SDLDS is an optional data set used to recover changes to the SDDS and SDIDS data sets made since the last backup of these data sets. Refer to the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference* for more information on recovering data.

Database Data Sets

The SDDS and SDIDS are key-sequenced VSAM data sets. The SDDS is the primary record-storage data set. Depending on how Tivoli Information Management for z/OS was set up at your location, you have either one or five VSAM data sets for each SDDS. Tivoli Information Management for z/OS views your SDDS as one logical data set, whether your SDDS consists of one VSAM data set or 100 VSAM data sets. Each VSAM data set can store up to 4 gigabytes of data.

The keyword records stored in the SDIDS are used to search for words stored in the SDDS.

A process called cognizing cross-references data that can be used in search arguments. The information in the SDIDS records can be in s-words, in p-words concatenated with specific user responses, or in abstract words entered by you. The *abstract words* are typically individual words from a description field.

Each record in the SDIDS contains the s-word, p-word, or abstract word and a bit string that indicates which records in the SDDS contain the indexed word. This inverted index database organization allows the Tivoli Information Management for z/OS search mechanism to locate all records containing a particular word (s-word, p-word, or abstract word) in a single read operation. Figure 1 on page 7 shows the relationship between the words in the SDIDS and the records in the SDDS.
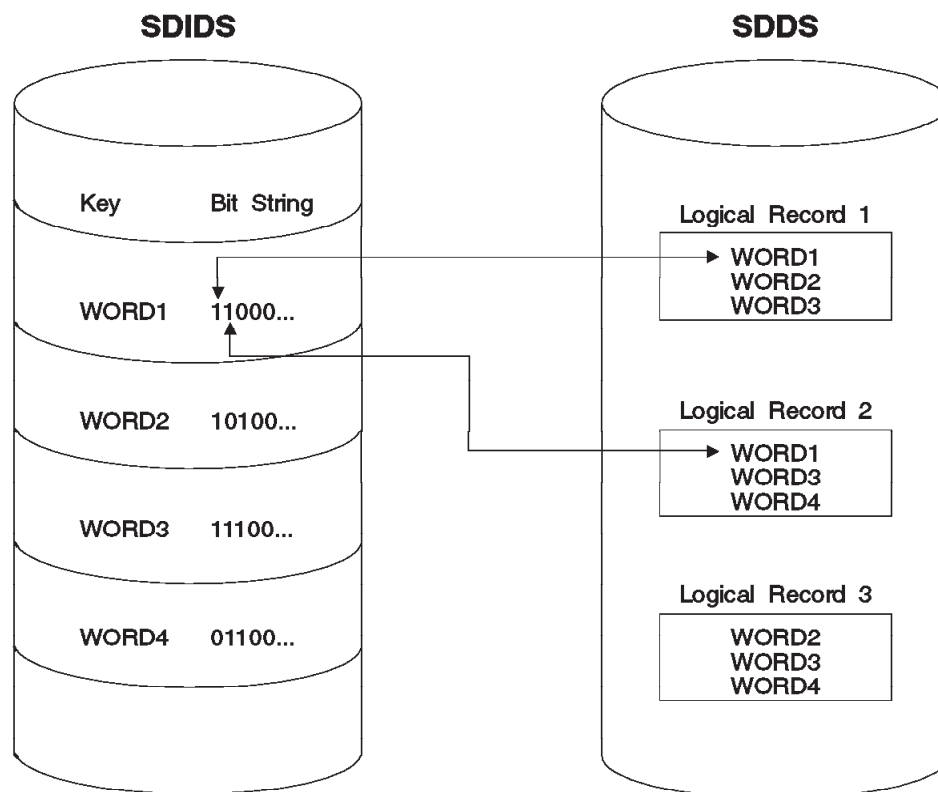
Figure 1. Relating the SDIDS to the SDDS

If you enter a search argument of WORD1 with the ARGUMENT or SEARCH command or by responding to an inquiry-mode panel, the search mechanism reads the SDIDS record for WORD1 and checks the bit string to determine which records contain WORD1. If you enter a search argument of WORD1 WORD3 (to retrieve records containing both words), the search mechanism reads the SDIDS for WORD1 and WORD3 and performs a logical AND operation on the bit string of each word. Table 1 shows how this works.

Table 1. Bit-String Setting Example

Argument	Bit-String Setting
WORD1	110
WORD3	111
Logical AND result	110 (Records 1 and 2)

For each word that is entered as part of the search argument, this process is repeated. For more information about search arguments and the Tivoli Information Management for z/OS search mechanism, refer to the *Tivoli Information Management for z/OS User's Guide*.

S-Words and P-Words

Depending on whether it is a selection or an actual value entered in a data-entry field, a piece of information collected from you through a Tivoli Information Management for z/OS panel is represented internally as an s-word or as a p-word to which the value entered on the screen is attached. S-words are attached to the data indirectly because they are cognized

separately. P-words prefix the value entered and are cognized as part of the value. The use of these structures allows for general as well as specific searches of the database.

All s-words and p-words related to a Tivoli Information Management for z/OS application are defined in the dictionary data set. Each dictionary word has an entry that is identified by a key, called its *index*. Using the PMF, you can print a report showing the contents of the dictionary data set to examine the s-words and p-words defined there.

The purposes of s-words and p-words are similar but not identical. S-words define record types and provide uniqueness in displaying data; p-words prefix and identify the collected data and allow a freeform search of the database. For more information about s-words and p-words and their functions, refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide*.

You can modify the externals of panels without directly affecting the database, because the structured descriptions are independent of the wording on the panels. Because Tivoli Information Management for z/OS uses these structured descriptions of the information on its panels, you must be very careful when making any changes to them.

Data Set Structure of SDDSs

With Tivoli Information Management for z/OS, you can have several databases, and each database can have only one logical SDDS consisting from one up to 100 VSAM data sets. Each SDDS can store up to 4GB of data, enabling you to store up to 4GB of data per database using one VSAM data set and up to 400GB of data using 100 VSAM data sets. Using multiple VSAM data sets instead of one data set is irrelevant to you when you are searching, updating, and filing records. However, an understanding of how the records are stored in the multiple VSAM data sets helps you in diagnosing problems.

Figure 2 on page 9 illustrates the way logical records are filed in multiple data sets, using five VSAM data sets as an example. The first logical record is filed in the first VSAM data set. The second logical record is filed in the second VSAM data set, and so on, through the fifth logical record. The sixth logical record is filed in the first VSAM data set, the seventh in the second VSAM data set, and so forth.
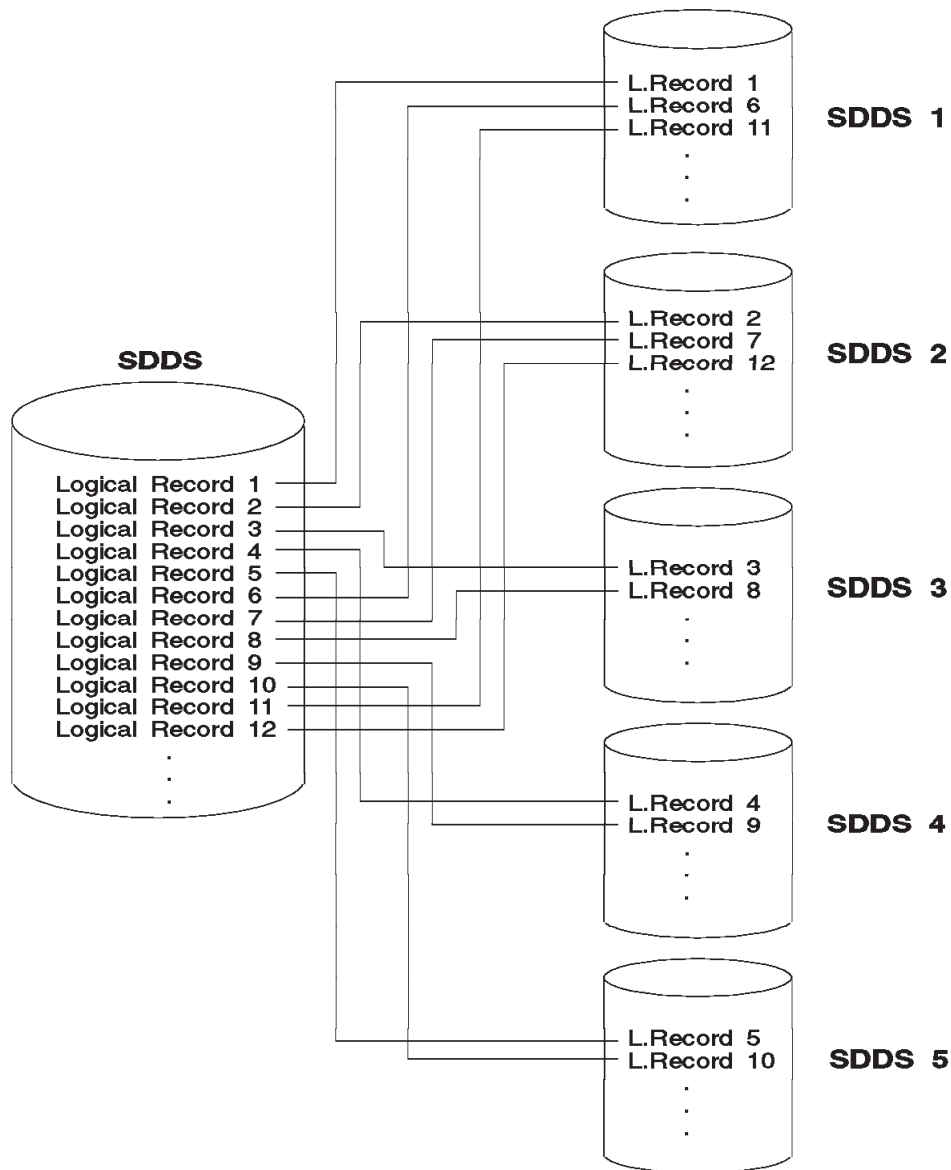
Figure 2. Logical Record Locations in an SDDS

A *logical record* in Tivoli Information Management for z/OS consists of one or more physical VSAM records. Each physical VSAM record that is related to the same Tivoli Information Management for z/OS logical record has the same root VSAM key. A *root VSAM key* (or *root key*) is the second through fourth byte of the physical VSAM key. All physical VSAM records with the same root key are stored in the same VSAM data set. See "Locating the Root VSAM Key" on page 44 for information on how to find a root key.

To determine which VSAM data set a particular logical record is in, divide the root VSAM key by 5. The remainder indicates which VSAM data set the logical record is in, as shown in Table 2 on page 10.

Table 2. Determining Which VSAM Data Set Contains an SDDS Record

Remainder	VSAM Data Set 1	VSAM Data Set 2	VSAM Data Set 3	VSAM Data Set 4	VSAM Data Set 5
1	X				
2		X			
3			X		
4				X	
0					X

For example, you need to know which VSAM data sets contain the records whose root VSAM keys are 157 and 255. First, divide 157 by 5. The result is 31 with a remainder of 2. Therefore, the VSAM data set record whose root VSAM key is 157 is located in VSAM data set 2.

Then divide 255 by 5. The result is 51 with a remainder of 0. The VSAM data set record whose root VSAM key is 255 is located in VSAM data set 5.

3

System Interfaces

This chapter describes the interfaces between Tivoli Information Management for z/OS and the system control program (SCP) and other programs.

ISPF Interface

Tivoli Information Management for z/OS uses the Interactive System Productivity Facility (ISPF) to perform terminal interactions and to store the users' profile in the ISPF data sets. The correct level of ISPF (as specified in the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference* for your operating system) is required to run Tivoli Information Management for z/OS.

All Tivoli Information Management for z/OS profile data is stored in the ISPF variable pool in a single variable. The name of the variable is SPF#ISPC.

VSAM Interface

VSAM is used for all data sets except the RFT data set. Standard interfaces are used for all VSAM requests.

Data is shared among the user OS/390 address spaces through the BLX-SP.

Data set serialization is controlled through the use of enqueuing or dequeuing services. See Data Set Resources for the resource names used with the queuing macros.

Enqueuing Resources

Tivoli Information Management for z/OS uses the enqueuing or dequeuing system services to serialize various resources. This chapter defines these resource names used by Tivoli Information Management for z/OS.

BLX-SP Server Resources

The major name BLXCAS and a minor name specifying a subsystem are used by Tivoli Information Management for z/OS to ensure that only one instance of a particular BLX-SP is running on a system at a time. For example, if you try to start a BLX-SP with a subsystem name of BLX1 when a BLX-SP with that subsystem name is already running, you receive an error message and the requested BLX-SP does not start.

The 4-character minor name consists of the name of the subsystem associated with the BLX-SP. The SCOPE of this enqueue is SYSTEM.

Data Set Resources

BLX-SP permits sharing of VSAM data sets among users. The databases are opened when the database is first accessed and remain open until either a FREE command is issued for the data set, or the BLX-SP server is stopped. The normal free does not complete until the user finishes.

When the Tivoli Information Management for z/OS user address space accesses a data set within the database, it enqueues the data set as follows:
- When it reads from the data set, the enqueue is shared
- When it writes to the data set, the enqueue is exclusive

If the data set is not shared between BLX-SPs, the SCOPE of the enqueue is SYSTEM. If the data set is shared between BLX-SPs, the SCOPE of the enqueue is SYSTEMS.

The following data sets use the enqueue mechanism:
- SDDS
- SDIDS
- SDLDS
- Dictionary data set
- Read and write panel data sets

Accessing a Data Set

The major name BLXDASDS and a minor name specifying a data set are used by a Tivoli Information Management for z/OS user address space to get access to a data set. The 44-character minor name consists of the data set name, which can be padded on the right with blanks.

This enqueue is used to serialize read access and write access to the data set to ensure that only one user can write to a data set at any one time, although several users can read the data set at any one time.

Database Records Are Serialized

The use of individual records is serialized using the record ID and the root VSAM key of the record in the SDDS.

Record Identifier

The major name BLGRNID and a minor name that specifies an SDDS data set name and record ID are used by Tivoli Information Management for z/OS to enqueue on that record ID.

The minor name consists of the data set name for the SDDS, followed by the record ID in parentheses. For example, INFO.SDDS(USER01).

Whenever you are creating a new record and enter a user-assigned record identifier, the system enqueues on that record ID so that other Tivoli Information Management for z/OS users cannot assign the same record ID to their records.

System-assigned record identifiers are always numeric and are not enqueued because they are unique and are controlled by a record in the SDIDS.

Database Record Key

The major name BLGSEQN and a minor name specifying an SDDS data set and a 4-byte root VSAM key in character format are used by Tivoli Information Management for z/OS to

enqueue on a database record key. The minor name consists of the data set name for the SDDS, followed by the root VSAM key for the record in parenthesis. For example, INFO.SDDS(00000006).

Whenever a database record is read for update, it is enqueued. The record is dequeued after it is filed or when you cancel the update for the record.

Dictionary Entries

The major name BLGDICTN and a minor name specifying a data set and a type of dictionary entry are used by Tivoli Information Management for z/OS to enqueue on a dictionary entry.

Whenever a dictionary entry is created or updated, the entry type (s-word or p-word) is enqueued. The entry type is dequeued when processing completes or when you cancel.

The minor name consists of the data set name for the dictionary, followed by either the text S-WORD or the text PREFIX in parentheses, depending on the type of dictionary entry being accessed. Tivoli Information Management for z/OS does not enqueue on individual s-words or p-words. For example:

- If you select **s-word update** from panel BLM8CG00, the minor name is **INFO.DICTIONARY(S-WORD)**.

- If you select **p-word update** from panel BLM8CG00, the minor name is **INFO.DICTIONARY(PREFIX)**.

Panel Modification

The major name BLGPMFPU and a minor name specifying a data set and a panel are used by Tivoli Information Management for z/OS to enqueue on a panel.

Whenever a panel is read for update by PMF, it is enqueued. The panel is dequeued when it is filed or when you cancel the update request for the panel.

The minor name consists of the data set name for the write panel data set, followed by the panel name in parentheses, for example, **INFO.WPANELS(BLG0EN20)**.

Cognizer

The major name BLGVCGZR and a minor name specifying a data data set are used by Tivoli Information Management for z/OS to enqueue on the SDDS.

Any uncognized records in the Tivoli Information Management for z/OS database are cognized whenever the following occur:

- A database cleanup selection is taken from option 9 on the System application Primary Options Menu (BLG0EN10). Refer to the *Tivoli Information Management for z/OS User's Guide* for information on using DBCLEANUP.

- Tivoli Information Management for z/OS verifies that a user-assigned record number ID (RNID) is unique.

Therefore, these records can be searched.

The minor name consists of the data set name for the SDDS, for example, **INFO.SDDS**.

Analyzing Problem Symptoms

The symptoms of a problem often do not indicate the cause of the problem. To find the cause of a problem, you often need to collect and analyze other information about the problem, as well as understand the environment in which the problem occurred.

After you have defined the problem, you can analyze the information returned by the program, such as messages, ABEND codes, and dumps. You also might need to identify the exact events that led to the occurrence of the error. With this information, you should be able to identify the function that was being performed when the problem occurred and any specific circumstances under which the problem will occur again. When you know the problem symptoms, the function affected by the problem, and the exact environment in which the problem occurs, you can focus your attention better on the problem area.

For a problem involving an ABEND code or message, the symptoms help you isolate the failing function. You can begin your diagnosis by using this information to identify the nature of a problem. For example, is the problem affecting access to a VSAM data set? If it is, you direct your diagnosis to the data sets in question, identify the conditions that result in an error, and gather any additional information about the status of the data sets.

Other problems, such as those that result in output that is not valid or is incorrect results to a user response, are more difficult to analyze. In this case, it is often necessary to retrace all the steps that led up to an error, identify all the functions involved with these steps, and identify any recent changes made to these functions.

This chapter explains how to analyze the different symptoms, describes some typical problems and their possible causes, and introduces the diagnostic processes included in Problem Diagnostic Processes. These diagnostic processes help you to identify and correct many of your Tivoli Information Management for z/OS problems.

Diagnostic Aids

Problems that occur when using the system can exhibit different symptoms; the symptoms are clues to the nature of the problems. The various kinds of symptoms are:
- Problems accompanied by messages
- Abnormal-result problems
- Performance problems.

Problem Diagnostic Processes contains diagnostic processes that can help you identify and solve the associated problems. These processes are:

Before you start through a diagnostic process to analyze the internals of panels involved with any of these messages, ensure that you have consulted the message help panel or the *Tivoli Information Management for z/OS Messages and Codes* book to see if the problem can be easily resolved.

How you begin to analyze a problem that you detected because of a message depends on the message issued. To get the explanation of any message, you can go to either of two places:

■   *Tivoli Information Management for z/OS Messages and Codes*. This book explains all the messages that you might encounter when using the Tivoli Information Management for z/OS program.

■   Online help, using the HELP command. Online help is available for all messages you receive after initialization, unless your session ends because of the error.

   If a plus sign (+) appears to the left of the message number, more messages were generated than can be displayed. Type **HELP** and press Enter to view these messages. If you need further information, type **S** to the left of the message and press **Enter** to display its HELP information.

To print the message that appears on your screen, type **HELP** and press Enter, then type **PRINT ALL** and press **Enter**.

When a message appears on the Tivoli Information Management for z/OS user's screen, it indicates that the system is unable to process correctly using the information provided. There are three types of messages:

■   **Validation messages** are issued by the panel processors when a user does not respond correctly to a panel. For example, if a user enters a response that is not valid on a data-entry panel and then does not correct it on the assisted-entry panel, a validation message appears. "Unexpected Validation Messages" on page 61 applies to problems accompanied by these messages.

■   **Dialog-processing messages** are issued by the dialog-processing functions in response to user-entered commands or panel responses. They indicate problems with the way groups of panels are interconnected. "Unexpected Dialog-Processing Messages" on page 62 applies to problems accompanied by these messages.

- **Panel-flow messages** are issued by the panel processors when they detect internal errors — problems with the way control moves from one panel to another. "Unexpected Messages Generated during Panel-Flow Processing" on page 63 applies to problems accompanied by these messages.

User responses, system programmer responses, and problem determination in the *Tivoli Information Management for z/OS Messages and Codes* book contain actions that help you analyze the problem. You should complete these actions before contacting the Tivoli Software Support Center.

The message might indicate that the error is associated with a panel or set of panels. If this is the case, determine if someone in your installation recently modified or created the affected panels. If they were not recently modified or created, it is possible that they were shipped with an error.

A message does not always represent the actual problem. It might precede actual recognition of a different problem or bring to light a different problem based on its occurrence. If you cannot resolve the problem by reading the message text, you can search your local problem database for previously reported problems associated with the message you received.

In the United States and Canada, you can also use the VIEW command to see if an APAR already exists for the problem. Outside the United States and Canada, use your local procedure to contact Tivoli to see if an APAR already exists for the problem.

The message ID should be sufficient to perform an effective search of your problem database. If you need to supply additional information to produce effective results, use the function being performed (such as a command) or any return codes or reason codes contained in the message. For additional information on search techniques, see "Searching for Duplicate Problems" on page 37.

ABENDs

There are two types of ABENDs. They are:

- **User abends** are issued by Tivoli Information Management for z/OS and accompanied by message BLX03113I

- **System abends** are issued by the operating system

Your first step in analyzing an ABEND is to decide which type it is: user or system.

Tivoli Information Management for z/OS user ABENDs are accompanied by message BLX03113I, which shows the ABEND code, the reason code, and as many module names in the save-area chain that fit into the message buffer. This message is not issued for system ABENDs. The reason code indicates why the ABEND was issued. The reason code is also in general register 15 at the time of the ABEND. The module names also appear in the save-area chain part of the formatted dump.

If your ABEND is a user ABEND, read the explanation in the Tivoli Information Management for z/OS *Tivoli Information Management for z/OS Messages and Codes* book. Problem determination for each ABEND code describes the actions you should take before contacting the Tivoli Customer Support Center.

If your ABEND is a system ABEND, consult the codes documentation for your operating system for a description of the ABEND. If you cannot determine the problem, use the ABEND code to search for the problem in your local database and :link. If you cannot find the problem in either database, request a dump to analyze the ABEND.

Tivoli Information Management for z/OS usually requests a dump when an ABEND is issued, but you do not get a dump unless a SYSUDUMP, SYSABEND, or SYSMDUMP data set has been allocated. Pre-allocate one of these DD names in your logon procedures or in a command list that starts Tivoli Information Management for z/OS to obtain a dump if you should experience a system ABEND. For additional information on dump procedures, see "How to Obtain a Dump" on page 38.

If you cannot determine what caused the ABEND by reading the explanation of the ABEND code and any message explanations, gather the documentation that you need for problem analysis. A dump of the ABEND is usually required, as well as a description of the events leading up to the error. When you begin to identify the specific error environment and the symptoms (elements) involved, create a search argument that contains the ABEND code and the name of the function or environment (such as command, record file, panel name, or generate mode) that failed. You can search your local problem database to see if the problem was reported. In the United States and Canada, you can also use the VIEW command to see if Tivoli is aware of the problem. Outside the United States and Canada, use your local procedure to contact Tivoli to see if Tivoli is aware of the problem. For additional information on search techniques, see "Searching for Duplicate Problems" on page 37.

If you are still unable to resolve the problem, contact the Tivoli Software Support Center. Because of your problem analysis efforts, you already have most of the documentation that is required when contacting the Support Center. See "Contacting Tivoli" on page 53 for more information.

Abnormal Results

Abnormal results occur when any output you receive is not what you expected. Maybe the system did not give any indication of an error; the fact that an error exists was detected only by you or one of your users.

Many of the problems you and your users are apt to find involve some kind of unexpected or incorrect result of Tivoli Information Management for z/OS processing. These abnormal results can usually be traced to problems with the panel-to-panel flow; they can be divided into the following categories:

■ Incorrect panels

The panel presented is not the one you expected to see. The diagnostic processes under "Missing or Obsolete Panels" on page 66 and "Incorrect Panel Appears" on page 76 deal with incorrect panels.

■ Table-panel display

The information presented in a table panel is incorrect, or information is missing from the display. The diagnostic process "Problems Displaying Data through Table Panels" on page 76 deals with table panel problems.

■ Database content

Information seems to be missing from the records in the database. "Data Missing from the SDIDS or a Database Record" on page 68 applies to this kind of problem.

- PMF report output

  The report output is either incorrect or incomplete. "Problems with PMF Report Output" on page 74 deals with PMF report problems.

- Dictionary display

  The data displayed is incorrect or not what you expected. "Problems with the Dictionary Display" on page 75 deals with Dictionary display problems.

- Other problems

  Includes abnormal results that involve the following:

  - Authorization codes

    See "Access Validation (Authorization) Problems" on page 65.

  - The use of program exits

    See "Missing S-Words Used by Program Exits" on page 67 and "Program-Exit Problems" on page 70.

  - Changing sensitive panels

    See "Problems with Application Select Panel" on page 72.

  - Problems with displaying, copying, printing, or deleting records

    See "Record-Access Problems" on page 71.

  - Panel validation

    See "PMF Panel-Validation Problems" on page 73.

Abnormal results also are caused either by input that is not valid for a function or by an internal logic error within the function. If the input is not valid, it might be the abnormal result of another function. You analyze the problem by performing each function until either the input is correct or the input came from a user. If the input is correct, the problem might be caused by an internal logic error; otherwise, there is a user error. If there is an internal logic error, the function is fixed by applying an APAR or PTF (program trouble fix).

If the problem is related to the database or database records, determine if the database is damaged. If it is damaged, you must recover one or more data sets within the database. Try using alternate methods of accessing the same data. For example, suppose you are missing records in a report. If there is incorrect input to the report function, either the database is damaged or the report format (RFT) statements are incorrect. You can use the SEARCH command with the same arguments specified in the SEARCH RFT statement to see if the missing records appear in a search results list. If the correct records appear in the search results list, the database contains the correct data, and there might be a Tivoli Information Management for z/OS programming error in the report function.

If the correct records do not appear in the search results list, the database could be damaged. In this case, continue your analysis with "Inaccurate Search Results" on page 22.

The following sections help you analyze abnormal results, depending on the type of output or function involved.

Incorrect Database Reports

If you receive incorrect output on a report, the following information helps you analyze the problem. The output for reports is created from report format table (RFT) statements and database records.

Report Format Table Statements
RFT statements specify:

- Constant data

- Record retrieval control

- Output format

Constant data: The constant data is literal data that is printed without change. The constant data could be missing, truncated, overlaid, or in the wrong position in the report. If it is missing or truncated, there might be a programming error in the RFT. If the constant data is overlaid, determine what data is overlaying the constant data and consider it as data in the wrong position in the report. If the data is in the wrong position, see the discussion of **Output Format:** on page 20.

Record Retrieval Control: Information in the RFT SEARCH statement controls which records should appear in the report and in what order. If extra or wrong records appear in the report or records are missing from the report, look for a SEARCH statement that defines the records to be included in the part of the report where the error was detected. The SEARCH statement is used to control what records are processed from the database.

Other problems with the report and their possible causes follow:

- If none of the records in the report is correct, or if no records are shown at all, there might be an error in coding the arguments on the SEARCH statement.

- If a few records are missing from the report, either the argument on the SEARCH statement is too definitive or the records do not contain the data specified in the argument on the SEARCH statement.

- If a few extra records appear in the report, the argument on the SEARCH statement is not definitive enough, or the data might be in more records than you expect.

- If a few records appear out of sequence in the report, ensure that the sort fields in the SEARCH statement are valid. Also, some of the records might not contain the data to be sorted. Records that do not contain the sort field data are processed before records that do contain the sort field data.

- If the value you are searching on appears more than once in a record, the record might appear several times in the report. You might need to change your sort variables. A single p-word can appear many times in a record, for example, but an s-word should only appear once.

If the argument and sort information in the SEARCH statement seem correct, there might be an error in the database. Attempt to re-create the missing or extra record problem, using the Tivoli Information Management for z/OS online facilities (for example, DISPLAY, UPDATE, and SEARCH). This way, you use two different functions to access the same records. If the error occurs from both functions, the problem lies in the database records. Otherwise, there is a problem in the report facility programs. See "Abnormal Terminal Displays" on page 21 for analyzing database record problems.

Output Format: The output format for reports deals with the positioning of data on the report. Formatting problems include fields that are not aligned, data in the wrong output rows or columns, and data in the wrong fields.

Data appears in the wrong field because either the RFT statements specify the wrong s-word or p-word index or the s-word or p-word for the data in the database record is incorrect. To check on the database record content, see Abnormal Terminal Displays.

For any other formatting error, either the output format specification in the RFT statement is incorrect or there is a programming error in the report facility. For more information on reports, refer to the *Tivoli Information Management for z/OS Data Reporting User's Guide*. If there is a programming error, contact the Tivoli Software Support Center.

Database Records

The content of the record includes structured data fields, freeform text, and administrative history. S-Word and p-word indexes in the RFT statements control which data is retrieved from the database. When data from the record is missing or in the wrong field on the output, the s-word and p-word indexes in the RFT statements do not correspond to the s-words and p-words in the record.

This mismatch means that either the specification of the s-word or p-word indexes is incorrect in the RFT statements or the s-words and p-words in the database records are incorrect. Synchronization of s-words and p-words in the RFT statements, dictionary data set, panels, and database must be maintained in order to provide precise retrieval and formatting of data. In other words, if you modify panels, you must also update any existing RFT statements that collect the changed s-words or p-words. If the s-word or p-word indexes in the RFT statements are correct, see Abnormal Terminal Displays to validate the other kinds of input.

Abnormal Terminal Displays

Terminal displays contain data that is presented to the terminal user. The displays are constructed by merging information from a data set and the terminal input with one or more panels from a panel data set.

Begin the analysis of abnormal results for terminal displays by determining the type of display in error. The following are the types of displays:

- Search results. This includes displays from the SEARCH and EXECUTE commands and privilege-class selection lists. For more information about potential problems, see "Inaccurate Search Results" on page 22.

- Database records. Various functions within Tivoli Information Management for z/OS display parts of a database record. See "Inaccurate Data in Records" on page 25 for more information about the following functions and potential problems:
  - Data-entry panel display
  - VIEW and VIEW INTERNALS command display
  - Freeform text display
  - ARGUMENT command display
  - History display

- GLOSSARY command display. The GLOSSARY command is used to display the contents of the glossary data set (the SDIDS) for a database. The glossary contains all searchable words (abstract words as well as p-words and s-words) actually contained in the database. If a word does not appear in the glossary, a search does not find it. For more information about potential problems, see "Abnormal GLOSSARY Command Display" on page 31.

- DICTIONARY data set display. The dictionary contains all the s-words and p-words that have been defined to Tivoli Information Management for z/OS. dictionary data is displayed when you select DICTIONARY from the Panel Modification Facility primary options panel. The dictionary data set is displayed through the use of a table panel. For problem symptoms in the Dictionary display, see page "Problems with the Dictionary Display" on page 75.

- PMF panel displays. PMF panel displays appear when you update Tivoli Information Management for z/OS panels using the Panel List or Panel Update functions of PMF. For more information about potential problems, see "Abnormal PMF Displays" on page 32.

- ISPF split-screen mode. For guidelines on using split screens, see "What to Expect While Using Split Screens" on page 32.

Inaccurate Search Results

The input to this function is a search argument that you create. Tivoli Information Management for z/OS uses the search argument to retrieve records from the SDDS. The results are displayed in a search results list. The search results list can present the following problems:

- Missing records

  This could be caused by s-words or p-words used in the search argument that do not exist in the records that are missing. If you used the NOT operator in your search argument, ensure that you used it correctly—as an "inverse and", *not* an "inverse or". For more information on the NOT operator, refer to the *Tivoli Information Management for z/OS User's Guide*.

- Extra records

  This could be caused by s-words or p-words in the search argument that exist in the extra records but should not be there.

- Wrong records

  None of the records in the entire search results list are the correct records. In this case, you might have entered an incorrect search argument. Or, maybe a create-path panel was changed to collect different s-words or p-words, but the inquiry-path panel was not changed.

  Another possibility is that the length of the SDIDS key used when setting up the database is limiting your searches. The SDIDS key length can be set to 18 or 34 bytes. With a key length of 18, your search argument can be up to 16 characters long. With a key length of 34, your search argument can be up to 32 characters long. The extra two bytes in the 18- or 34-byte key lengths is used by Tivoli Information Management for z/OS internally to prevent spanning and is not included as part of the searchable argument. The longer key lengths of 34 bytes enables you to do more exact searches, because Tivoli Information Management for z/OS is able to search on more characters in the argument.

- Duplicate records

  A record can show up more than once on the search results list if one or more records contain the p-word several times. This can happen if the standard sort is used. The efficient internal sort eliminates this. For information about the SORTPFX parameter, refer to the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference*.

- Data displayed on wrong panel

  This might not be the panel you expect to appear, but it is not necessarily the wrong panel. For more information about the SEARCH command and how Tivoli Information Management for z/OS determines the search results list display panel, refer to the *Tivoli Information Management for z/OS User's Guide*.

If you get unexpected records on a search results list, you must compare the p-words and s-words used in the search argument with the p-word and s-words contained in the records in error. You can use the STATISTICS command to help with this. It shows you the number of occurrences of each element of the search argument and the cumulative effects each element has on the search results. For more information about the STATISTICS command, refer to the *Tivoli Information Management for z/OS User's Guide*.

Use the following technique to perform your comparison:

1. **Verify the search argument.** Issue **VIEW ARGUMENT** to display the current search argument and verify that it was entered correctly. If it was not, enter it again. If the search argument was correct and you were searching the correct database, issue **VIEW INTERNALS** to look at the internal format of the search argument. This format lets you look at the s-words and p-words collected at the time of the search. If s-words or p-words in the search argument are not cognized, they are used for the search. If you are not familiar with the VIEW command, see "Using VIEW INTERNALS" on page 40, or refer to the *Tivoli Information Management for z/OS User's Guide* for more information.

2. **Print the internal-format display of the search argument.** Issue **PRINT ALL** while viewing the internal display of the search argument.

3. **Display the record in error.** Issue the **DISPLAY** command, specifying the record ID of a record that is missing, extra, or wrong.

4. **Display the internal format of the record.** Issue **VIEW INTERNALS**. This shows the s-words and p-words for the record.

5. **Print the VIEW INTERNALS results.** Use the **PRINT ALL** command to print the displayed results of the VIEW INTERNALS command.

6. **Compare the listings.** Compare the search argument listing with the listing of the internals for the record and look for the following:

   - An s-word or p-word in the search argument that is not contained in the record. This results in a missing record.

   - A record containing all s-words and p-words from the search argument, but with one or more of the entries not cognized. The entries that are not cognized are not included in the SDIDS, so they are not searchable. This record is missing from the search results list.

   - S-words or p-words in the record that are also contained in the search argument. You should further qualify your search argument. This is an "extra records" condition. For example, searching on reporter phone number 469-1234 searches for the reporter phone s-word and phone p-word with phone number. The record can have these entries, but they can be out of context. The record can contain the phone p-word and phone number as something other than reporter (resolver, for example). The record can have the reporter phone s-word with a different phone number; and this record appears on the search results list because it matches the search argument.

- The wrong s-word or p-word collected in the search argument. This could be a word you entered incorrectly or specified incorrectly in one of the inquiry panels; it would result in retrieval of the wrong record.

7. **Resolve the problem.**

   To resolve the problem, determine which of the following apply:

   - If the comparison shows the correct s-words and p-words in both the search argument and the record, the problem occurred because of one of the following:

     - The SDIDS is not synchronized with the SDDS.

       Ensure that the SDIDS you are searching is paired with the correct SDDS. If these data sets are not correct, run the SDIDS rebuild utility (BLGUT1) to match the SDIDS with the SDDS. For information on how to use this utility, refer to the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference*.

     - The search argument is subject to context errors.

       This is usually due to the collection of an s-word and p-word pair for display context where the same p-word is used to collect several fields (such as, phone number). When a record has these s-word and p-word paired fields collected, searching for an assignee phone number can result in extra records if the phone number being searched was collected as a resolver phone number. This is because the s-word was collected and cross-referenced for assignee data, and the p-word was collected and cross-referenced for resolver data.

     - There is a programming error in the search function.

       Contact the Tivoli Software Support Center.

   - If the comparison shows that certain s-words or p-words are wrong in either the search argument or the record, you have to determine how the s-words or p-words were created in either the search argument or the record. If the s-words or p-words and the panels that collected these words are unmodified Tivoli-supplied panels and Dictionary entries, there is a problem with either the Dictionary data set or the panels shipped with Tivoli Information Management for z/OS. Contact the Tivoli Software Support Center.

   - If your installation modified or created the s-words or p-words or the panels that collected these words, see page "Problem Diagnostic Processes" on page 61 for techniques on how to diagnose panel errors.

Sometimes an item in the search results list is marked DELETED. This happens when more than one user accesses the database at the same time, and one of those users deletes a database record.

When you start the search function, records that match your search criteria are determined, based on the information in the SDIDS. The matching records are read from the SDDS to create your search results list. Only enough records are read from the SDDS to fill the buffer. (You can change the size of this buffer by changing the LINECNT value in your session parameters. Refer to the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference* for more information.) When you scroll through your search results list, additional records are read from the SDDS to fill the buffer.

Tivoli Information Management for z/OS determines which records meet your search criteria, using the information in the SDIDS. When you scroll through the records, Tivoli

Information Management for z/OS reads the next group of records to scroll from the search results list. If Tivoli Information Management for z/OS cannot find a record in the SDDS, it assumes that another user deleted it.

Additionally, a user could have deleted the record, and still another user could have created a new record that, just by chance, has the same root VSAM key. When you select the record, it might not match your search criteria. If the record was updated since the search was performed, message BLG03082I is displayed. Refer to the *Tivoli Information Management for z/OS Messages and Codes* book for more information about this message. If you cancel the search results list and start the search function again with the same search criteria, the deleted record should no longer appear in the search results list.

If the deleted record still exists in the search results list, the SDIDS is not synchronized with the SDDS. From the Primary Options Menu of the System application (BLG0EN10), select **DBADMIN**. Then, from the Database Administration Selection panel (BLG0Y100), select **DBCLEANUP**. Selecting **DBCLEANUP** calls a program exit that cognizes and files any partially-filed records that were marked BUSY or DELETED as a result of a system outage or ABEND.

If the deleted record still exists, DBCLEANUP might not have been able to recover the record. DBCLEANUP tells you how many records need to be cleaned up and how many records it was able to clean up. If DBCLEANUP could not recover all records that need cleaning up, the database might be full. If the problem is not corrected, you may be using an incorrect or damaged SDIDS.

If another user modifies a record that appears in your search results list, when you select that record from your list, Tivoli Information Management for z/OS notifies you by issuing message BLG03082I. You get this message if a record was changed or if the record was deleted and another created in its place, with the same root VSAM key. Refer to the *Tivoli Information Management for z/OS Messages and Codes* book for more information about this message.

Inaccurate Data in Records

Various functions within Tivoli Information Management for z/OS are used to display the contents of records. Each function uses a panel and parts of the record to formulate a display image. The following sections discuss the various functions used to display records and the problems you could experience using these functions.

Data-Entry Panel Display: Data-entry panels are used for displaying and updating records. If the field is unprotected and you are authorized for that field, you can enter data into that field. Otherwise, the fields are protected from entry.

The input for the fields displayed on data-entry panels comes from the structured description entries (SDEs) for the record. S-words or p-words in the panel determine which SDEs contain the data to be displayed.

The problem symptoms that can occur with data-entry panels are:

- Missing data

  This condition occurs when you type data into a field, but it disappears when you press Enter. The s-words or p-words are collected by the assisted-entry panel for data-entry panel selections. The s-word or p-word in the assisted-entry panel may not be the same as the s-word or p-word in the data-entry panel. The data-entry panel always displays

data using its s-word or p-word. If the data-entry panel s-words and p-words are different than the assisted-entry panel s-words and p-words, the data is not displayed. This symptom can also occur if a single s-word is used for more than one field in the record. Tivoli Information Management for z/OS displays only the most recent occurrence of the s-word's associated data on the data-entry panel. Likewise, for display panels, the s-word or p-word in the summary display panel might not be the same as the s-word or p-word that was used in the assisted-entry panel when the data was collected. The assisted-entry panel is not used when displaying a record; it is used only in creating or updating a record.

- Data in the wrong field

  This condition occurs when data entered in one field is displayed in another field. In this case, the s-word or p-word in the data-entry panel matches the s-word or p-word collected by an assisted-entry panel for a different field.

- Truncated data in fields

  This condition occurs when you respond to the assisted-entry panel for a field with more data characters than the field on a data-entry panel can hold. The length of the field on the data-entry panel is controlled by the beginning and ending field attribute characters in the external panel definition. In this case, length-control information in the assisted-entry panel permits more characters than the number of spaces in the data-entry panel. Length information in an assisted-entry panel always defines the response length allowed; length information in a data-entry panel controls only the display.

- Duplicate data

  This condition occurs when a word entered into a field is displayed twice in the field. This is caused by using a multiple-pattern word with duplicate p-words in the assisted-entry panel for the field.

See page "Problem Diagnostic Processes" on page 61 for assistance in diagnosing panel errors.

VIEW and VIEW INTERNALS Command Display: Data is displayed in different formats, depending on how you enter the VIEW command, either without operands (allowing the default, ARGUMENT) or with the INTERNALS operand. The two formats used are produced by different Tivoli Information Management for z/OS modules and are displayed on different panels. Therefore, it is important to distinguish which function is being used when an error occurs.

The input for either VIEW display is the SDEs for the current record. S-words and the length of the columns in the VIEW table panels are used to determine which data is to be displayed.

The types of problem symptoms that can occur with the VIEW display are:

- Missing or truncated data

  Missing data in the VIEW display occurs when an s-word for a column in the VIEW table panel is replaced or altered. If this happens, the column in the display is filled with blanks.

  Truncated data occurs when the length of the data, specified in the SDE, is greater than the length of the column, specified in the table panel. If the data in the display is truncated, issue the VIEW INTERNALS command to display the same data in a table format.

- Data displayed in the wrong column

  This condition occurs when the s-words or column headings in the VIEW table panel are taken out of sequence. Each column of the table panel contains an s-word that identifies the data to be placed in that column. When an incorrect pairing of column s-word and column heading is found, the column is displayed with incorrect data.

If you have not modified the VIEW command display panels and the record being displayed contains the correct information, there might be a Tivoli Information Management for z/OS programming error. Search your problem database, using the VIEW command as the only search argument, to find a duplicate problem.

In the United States and Canada, you can also use the VIEW command to see if an APAR already exists for the problem. Outside the United States and Canada, use your local procedure to contact Tivoli to see if an APAR already exists for the problem.

Freeform Text Display: The Tivoli Information Management for z/OS freeform-text processor recognizes three different field types. They are:

- Line Command

  Used to enter freeform-text line commands

- Control Data

  Used to display control data (including time, date, user ID, or privilege-class information) about each line

- Text

  Used to enter or display the freeform-text data

These fields, and their relative positions within the display, are determined by the freeform-text table panel used to define the display. There is a separate table panel for each type of text within a Tivoli Information Management for z/OS record. The name of the table panel to be used for a particular display is extracted from the **Inquiry** target field of the control line of the panel from which the freeform-text processor is started. For a given type of text, one table panel is used to create text data (create mode if you use the Tivoli Information Management for z/OS freeform-text editor), and another is used to display text data (display mode).

The types of problems that can occur on a freeform text display are:

- Text displayed on ISPF/PDF panel when a Tivoli Information Management for z/OS table panel was expected.

  For information about using the ISPF/PDF editor, refer to the *Tivoli Information Management for z/OS User's Guide*.

- Wrong text data displayed

  Both the s-word identifying the type of text to be displayed and the table panel to be used for the display are extracted from a control line on the panel from which freeform text is selected. In this case, the control line associated with the data in error contains the wrong s-word identifier.

  The s-word used to identify a given type of text data within a record is the same in both create mode and display mode. Therefore, ensure that there is not a mismatch between the panel used to start the freeform-text processor in create mode and the one used in display mode.

- Text displayed on Tivoli Information Management for z/OS table panel when the ISPF/PDF editor was expected.

  For information about using the ISPF/PDF editor, refer to the *Tivoli Information Management for z/OS User's Guide*.

- Correct text data displayed on the wrong table panel

  Both the s-word identifying the type of text to be displayed and the table panel to be used for the display are extracted from a control line on the panel from which freeform text is selected. In this case, the control line associated with the panel in error contains the wrong table panel name in the Inquiry target field.

- Wrong text data displayed on the wrong table panel

  Both the s-word identifying the type of text to be displayed and the table panel to be used for the display are extracted from a control line on the panel from which freeform text is selected. In this case, the control line associated with the display in error contains the wrong table panel name in the Inquiry target field and the wrong s-word identifier.

  The s-word used to identify a given type of text data within a record is the same in both create mode and display mode. Therefore, ensure that there is not a mismatch between the panel used to start the freeform-text processor in create mode and the one used in display mode.

- Data fields in the wrong order

  The text field and the control data field are both identified in the table panel by their own s-words. You might have switched these two s-words. Also, the line command field is indicated by identifying the field as a line command field in the table panel. It can appear anywhere within the panel, but there can be only one line command field. The line command field must not be either the text field or the control field.

- Data field is missing

  Only three types of fields are recognized on a text panel display: line command, control data, and text. If you specify any field with a type other than one of these three types, that field is left blank on the display.

  Another possibility is that the **Column width** field contains a value of zero. The **Column width** field defines the length of the field on the display. It is equal to the number of character positions between the attribute bytes used to define the column in the table panel that displays the test data. If the beginning and ending attributes are adjacent (zero-length field), no data can be displayed in the field.

  If the text lines are to be numbered, the table panel should indicate that the line command field is also a sequence-number field.

- Data within a field is truncated

  This condition can occur for several reasons. If the text data was created on a text panel that specified a maximum data width larger than that of the current table panel, lines that are longer than the current maximum are truncated. To see all of the data, increase the maximum data width of the current table panel.

  If this is a display-mode panel, its maximum data width might not be the same as the maximum data width of the create-mode panel used to create this type of freeform text data.

  Another possibility is that the column width defined in the table panel is shorter than the maximum data width of the field. (The **Column width** field defines the length of the field on the display. It is equal to the number of character positions between the attribute bytes used to define the field in the table panel.) If this is the case, use the LEFT COL

or RIGHT COL commands to horizontally scroll the data into view. For more information on scrolling, refer to the *Tivoli Information Management for z/OS User's Guide* .

■ Control data is missing or in the wrong order

Missing control data, though not visible, might actually exist. When you are updating or displaying freeform text with the Tivoli Information Management for z/OS editor, issuing the LEFT COL and RIGHT COL commands with the cursor on the control data scrolls any existing data in that part of the panel.

Missing control data might actually be a result of truncation. You might have to increase the maximum data width of the control field, because control data is moved into this field until all of the requested data has been formatted or until there is no more room. Generally, it requires 8 character positions for each type of control data that you want to see. Set the maximum field width to 32 if you want to see time, date, user ID, and class-control data.

Another possibility is that the ISPF/PDF editor was used to update text in a record that already contained freeform text of that type. If the session parameter being used has TEXTAUD set to NO, all control data for existing freeform text of that type is deleted when the ISPF/PDF editor is used to update the text.

Another possibility is that you are using an incorrect control information identifier in the control panel (BLG1ACTL) that specifies the control data you want collected or displayed. Only four types of control data are allowed:

• DATE (DAT*/) The date the line was entered or last updated

• TIME (TIM*/) The time the line was entered or last updated

• USERID (USER/) The ID of the user who entered or last updated the line

• CLASS (CLA*/) The privilege class of the user who entered or last updated the line.

The order in which these p-words appear on the control panel controls the order in which the data is collected and displayed.

The asterisk (*) indicates that this position is ignored in identifying the control data type. You can use any date p-word (such as DATA/, DATR/, or DATE/) to collect date control data. This also applies to the other p-words.

If you change BLG1ACTL and subsequently attempt to display a record that does not contain all of the control data currently specified, any missing data is left blank. For example, suppose you create text data in which you are collecting only date information. If you then change BLG1ACTL to collect time and user ID in addition to date, only date appears in the control field of this record's text display. However, if any new lines are entered or modified, all three items of control data are subsequently collected and saved.

Control data appears in the control field of only the first line of any group of lines to which that control data applies. If two consecutive lines have identical control data, that data does not appear in the second line. Also, if panel BLG1ACTL is missing from your panel data set, control data defaults to date, time, and user ID (in that order). For more information, refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide*.

■ Input field is protected

Regardless of the attribute byte that you define for the beginning attribute byte of the control data field, this field is always protected (output only). Likewise, all fields are protected on the freeform-text display-mode panel. However, if the line command field or the text field is protected on a create-mode text panel, examine the beginning attribute byte in the associated text table panel. You might have inadvertently made one or both protected.

You might intentionally want to protect either or both of these fields on a particular table panel if users are, for some reason, not allowed to enter or modify freeform text data of the given type.

ARGUMENT Command Display: This panel appears when the ARGUMENT command is entered. The input for this display comes from the SDEs that have been collected from the structured search path, as well as any arguments that have been entered previously on this panel.

The problem symptoms that can occur with this panel are:

■ Missing or extra data

If this problem occurs for the arguments in the top (locked) portion of the display, verify the following:

- The maximum number of lines displayed in this area is nine. If you have more than nine lines of data, they are truncated and you cannot see them on this display. You can, however, issue the VIEW command to see the remaining arguments.

- The table display panel might have been changed to allow fewer application block data lines than actually exist.

- The **LINE** *xxx* **OF** *xxx* wording appears on a line by itself. Therefore, it is possible that data has been truncated even though there seems to be enough room for it on this line.

- If there are missing arguments, they might have been collected from a panel with COGNIZE=NO specified. Issue a VIEW INTERNALS. If the missing item appears on this list, go to PMF panel update and change the appropriate cognize setting to YES.

- If there are extra arguments, these are probably arguments that were previously displayed on the lower portion of the screen. Freeform arguments are moved from the bottom to the top of the display when arguments are subsequently collected through the structured search path.

If this problem occurs on the bottom of the display, consider the following:

- If there are missing arguments, maybe they were moved to the top of the display. Freeform arguments are moved from the bottom to the top of the display when arguments are subsequently collected through the structured search path.

- If there are extra arguments, maybe they were moved from the top of the display by a series of BACK or CANCEL commands. When freeform arguments are followed by structured arguments and the structured arguments are removed, the freeform arguments return to the bottom of the display.

If this problem occurs on either the top or the bottom of the display, consider the nesting of commands:

- If only the current arguments are displayed, it is possible that the current arguments are entered when ARGUMENT and SEARCH are nested. For example, if you are on the ARGUMENT display and issue SEARCH PRIO/. and then ARGUMENT, you see the PRIO/. argument. If, however, you issue END before issuing ARGUMENT, you see the arguments that appeared on your original ARGUMENT display.

- END and CANCEL might be confusing because they affect only the current arguments. For example, issue argument A on the ARGUMENT display. Issue ARGUMENT again and add argument B. Issue ARGUMENT a third time and change the A to C. END returns you to the second invocation of ARGUMENT, with the current arguments being B and C. If you erase both arguments and then issue CANCEL, you see argument A. So even though you changed the A to C, you also canceled this change when you issued CANCEL.

■ Format not as expected

  If the current arguments displayed are not what you expected, it could be the result of one of the following:

  - Using Boolean operators. When you use the range symbol (-), the arguments on either side of it appear on the same line, when possible, regardless of where you entered them. When the OR symbol (|) is issued at the end of a line, it moves to the beginning of the next line.

  - The position of arguments is maintained only for the line in which they are issued. In other words, if you issue two arguments, one anywhere on the first line of the display and the other anywhere on the last line of the display, issuing END and issuing ARGUMENT again displays the arguments on successive lines, both starting in column 1 of the display.

History Display: The history display is used to view the journalized data from the current record. The input for this display is the administrative history entries (AHEs) for the record.

The problem symptoms that can occur with the history display are:

■ Missing data

  Each column of the history-display table panel contains an s-word or p-word that identifies the data to be placed in that column. When an s-word or p-word contained in the panel does not match an s-word or p-word contained in the AHEs, the column appears in the display filled with blanks.

■ Data displayed in the wrong column

  This condition occurs when an s-word or p-word from the AHE matches an s-word or p-word in the wrong column in the history-display table panel. This is caused by an incorrect pairing of an s-word or p-word with a column heading in the table panel.

Abnormal GLOSSARY Command Display

The glossary display is used to view the contents of the SDIDS. The input to this function is an optional keyword on the search argument that indicates the glossary record at which the display is to begin. Before attempting to analyze a glossary display problem, you should be familiar with the database architecture, in particular how the SDDS and SDIDS relate to each other. For this information, see Database Architecture.

The problem symptoms that can occur with the glossary display are:

■ Missing or skipped records

If a database record is deleted by another user while you are viewing the glossary, subsequent scrolls of the glossary do not show the data from the deleted record, and the corresponding SDIDS record is not displayed.

■ Formatting errors

This symptom occurs when the maximum length of the column in the glossary table panel is not large enough. If the column's maximum data length is set at less than 25, internal errors will occur and prevent the successful completion of the function.

Abnormal PMF Displays

Problem symptoms can also occur while you are in the PMF dialogs. If the PMF dialog panels have not been modified by your installation, the abnormal results might be caused by a Tivoli Information Management for z/OS programming error. PMF uses a table of s-words to control the operation of the various dialogs within itself. These s-words are also contained in the PMF dialogs. Therefore, modification of these s-words to change the control section of a PMF panel being modified can also affect PMF displays.

You should ensure that the correct s-words are being used for the correct purpose in your modified PMF dialog panels. You can validate the panels by comparing the listing of the Tivoli-supplied panels, with the listing of your modified PMF panels. Ensure that required fields on the Tivoli-supplied PMF panels are also required on your panels. It is very important to maintain the s-words used in the PMF dialogs; they should *never* be changed.

If you maintain a separate panel data set for the Tivoli-supplied panels, attempt to perform the same function using only the Tivoli-supplied panels. If the error persists, there might be a programming error in Tivoli Information Management for z/OS. If the error does not occur with the Tivoli-supplied panels, your modifications to the Tivoli-supplied panels have caused the problem. For more information, refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide*.

What to Expect While Using Split Screens

Tivoli Information Management for z/OS enables you to place the command line either at the top or bottom of the screen (based on your profile). Because of this, the position of the command line might change when the ISPF split-screen function is started. This section describes the operation of Tivoli Information Management for z/OS when you start the ISPF split-screen function and the problems that might occur.

If you are going to use the ISPF SPLIT command, it is recommended that you set the command line location in your profile to TOP. If the command line location in your profile is set to BOTTOM, when the ISPF SPLIT command is entered, the following will occur:

■ The command line location is forced to the top of the screen. This causes the alternate screen (the lower screen), to have the command line at the top when it is first displayed.

■ When the primary screen (the upper screen) is first displayed, it has no command line. After you press a key on the keyboard while the primary screen is displayed, the command line is displayed at the top of the screen.

Throughout the split session, you can expect the following results:

■ The command line remains at the top on both the primary and alternate screens.

■ If either screen is a box panel (selection or assisted-entry panels), messages might not be displayed if the screen is split with 16 or fewer lines in either screen. On box panels, messages are displayed at the bottom of the screen. When an error condition occurs, the

message is issued but cannot be displayed. If you have an alarm, the alarm sounds, but the message is not visible. You should be able to detect the error because the panel being displayed remains the same.

If the split session is an ISPF session, type **=X** on the command line to end the session. If the split session is a Tivoli Information Management for z/OS session, type **QUIT** on the command line to end the session. When the split session ends, you can expect the following results:

■ The requested session ends normally.

■ The first screen displayed has the command line at the top of the screen. After you enter an interaction, the command line is restored as specified in your profile.

The command line location is moved only if your profile specifies a command line location of BOTTOM when split mode is ended. For example, if you change the profile command-line setting from BOTTOM to TOP while in split mode and then end the other session, the command line remains at the top of the screen after the other session ends.

Note: When you are using split screens (ISPF SPLIT), you should use the ISPF SWAP command, not the cursor control key, to swap between the two sessions.

Abnormal PMF Reports

PMF reports are used to produce listings and cross-references of panels. Many of the PMF reports are generated through the use of table panels. See the diagnostic process "Problems with PMF Report Output" on page 74 for aid in analyzing problems associated with the PMF reports.

Performance Problems

The performance of Tivoli Information Management for z/OS improves with each new version. However, there might be occasions when performance is not satisfactory. This section identifies symptoms you might experience, discusses key resources available to a transaction, and suggests tools and methods you can use to investigate performance problems. Refer to the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference* for more information about Tivoli Information Management for z/OS performance.

Performance Problem Symptoms

The most visible symptom of a performance problem is the time it takes to complete an interactive transaction or a batch job. Long response times are often the only symptom visible to most end users. Other performance problems might include the following:
■ Length of processor running time
■ Number of input and output operations
■ Amount of storage
■ Amount of DASD space used for an application or its data.

Key Resources

The number of resources used by a transaction, and the amount of time spent waiting for those resources, determines the end-user response time for that transaction. For example, Tivoli Information Management for z/OS uses system resources such as processors, input and output facilities, and enqueues to perform a transaction. When the system is not busy the transaction does not wait for other transactions to release system resources, and the end-user

response time is short. When the system is busy, the transaction must wait on other transactions to finish and release these resources, and the end-user response time increases.

The significant resources that Tivoli Information Management for z/OS uses are SDIDS enqueues, SDDS enqueues, and the CPU. DASD, controllers, and channels are not listed because they are accessed by the enqueue resources.

Investigation Methodologies

This section discusses techniques for investigating performance problems.

A long response time for a transaction might be caused by the number of resources that the transaction uses or the unavailability of resources that the transaction requires. To investigate a long response time for a transaction, do the following:

1. Perform the transaction when no other users are on the system.
   a. If the response time is long, go to step 2.
   b. If the response time is short, go to step 2a.

2. The amount of resource used by the transaction is causing the problem. Perform the following steps to determine which resources Tivoli Information Management for z/OS is using to process transactions, and how much demand the system is placing on those resources:

   a. Take the first measurement of the amount of processor time and the number of input and output operations performed for all active users before running the transaction. Use either the *Spool Display and Search Facility* function **S.DA**, or use another tool to take this measurement.

   b. Use the BLX-SP QUERY command to collect information on input and output operations for the Tivoli Information Management for z/OS VSAM data sets. These data sets include the SDDS, the SDIDS, various Panel data sets, the Dictionary data set and the Log data set.

   The QUERY report includes details on the number of GETs and PUTs by VSAM data set, and which of the GETs were satisfied from VSAM buffers such LSR buffers. Use `type=VSAM` and `type=IO` to generate reports to determine the before and after counts for the Tivoli Information Management for z/OS data sets. The IDCAMS LISTCAT report can provide information about the definition and status of your Tivoli Information Management for z/OS VSAM data sets. This information is only updated when a data set is successfully closed. It can be incomplete or inaccurate if the data set is in use, or a user did not close the data set after using it. See "Using IDCAMS" on page 39 for information about IDCAMS.

   c. Perform the transaction.

   d. Use either the *Spool Display and Search Facility* function **S.DA**, or use another tool to take the second measurement of the variables as in step 2a.

   e. Subtract the first measurement obtained in step 2a from the second measurement obtained in step 2d.

   f. If you do not have reasonable WITHNOIO counts, verify that your LSR buffers are set up correctly. Common errors include the following:

      ■ Insufficient buffers for either the data or the index components.

      ■ Mismatched CISIZES between the actual data set and the buffer specification in the BLDVRP.

■   Mixing data sets with different CICIZEs in a pool of data sets. The buffers must
     be large enough to contain the largest CI. If one of the data sets in the pool has a
     small CI, VSAM uses a large CI buffer for the small CI.

■   Mismatched buffer and data set names.

Many of these errors are legitimate configurations, but can result in very inefficient
NSR buffering instead of LSR buffering for key data sets.

To ensure that the facilities you use to improve performance are set up properly,
change the VSAM buffering specification for a data set if you change the CISIZE of
that data set.

  g. Reduce the use of resources by the transaction. Perhaps the transaction can be coded
     in a more efficient form, or some parameter affecting the transaction can be tuned to
     reduce the transaction's need for resources. Examples of such situations include the
     following:
       ■   An inefficient search criteria
       ■   Inefficient sort specifications
       ■   Unnecessary cognizing

3. The problem is related to contention for resources with other users. Consider adjusting
    the following items to improve response time:

■   VSAM data set buffering

■   DASD configuration

■   CACHE and DASD-Fast-Write

The IDCAMS report LISTDATA provides information on the effectiveness of
CACHE and DASD-Fast-Write for your VSAM data sets. Consider the implications
of CACHE or DASD-Fast-Write when you move data sets around to provide channel
or device isolation.

■   Processor scheduling priorities.

Sampling tools can provide a detailed view of processor utilization by load module,
CSECT or offset within a CSECT. Some sampling tools provide input and output
related statistics.

RMF™ provides performance information on the whole system in summary form and
on individual user IDs in detailed form. RMF I and RMF III provide batch and
online information on the utilization and delays caused by various resources. These
tools identify:
•   The users of the system
•   The resources they are using
•   How much time each resource is used
•   What delays other users are experiencing because of the use of resources

RMF or sampling tool investigations generally need workloads that last more than a
single transaction to measure. You can use the automation techniques built into
Tivoli Information Management for z/OS to help you measure such situations. For
example, you can:
•   Use IRCs or SRCs to generate sufficient activity long enough to measure the
    workload

- Use a loop with an IRC to cause a single transaction to be entered repeatedly while a measurement is conducted. This works well from a workstation where the enter keystrokes will be queued in the keyboard buffer.

5

Tools and Procedures for Resolving Problems

Tivoli Information Management for z/OS can provide some assistance in resolving your problems. The tools and procedures in this chapter help you find out if your problem has been found before. If your problem is unique, they help you identify the underlying causes. If the information you gather through the use of these tools is not sufficient for you to resolve your problem, contact the Tivoli Software Support Center for further assistance. See "Contacting Tivoli" on page 53.

Searching for Duplicate Problems

Presumably your installation has procedures for gathering and storing problem information. An online record-keeping facility, such as Tivoli Information Management for z/OS, can assist you in tracking your problems. It is important, however, that you are consistent in how you enter information into your database. If you are not, then people searching for problems similar to their own must include all possible variations of their problem in the search argument.

Your first step to resolving a problem is to search your problem database to try and find a duplicate problem. Finding that a problem was previously reported reduces the repetitive and time-consuming process of problem analysis. The key to finding duplicate problems is the search argument.

The search argument should be precise enough to retrieve a minimum set of records, but not so narrow as to eliminate the right record. If your problem results in a message, the message ID should besufficient to perform an effective search of the problem database for problems associated with the message you received. If additional information is required to produce effective results, use the function being performed (such as a command) or any return codes or reason codes contained in the message. If your problem results in a system ABEND, your search argument should contain the ABEND code, the reason code (if applicable), and the name of the function or environment (such as command, record file, panel name, or generate mode) that failed. If your problem results in a Tivoli Information Management for z/OS ABEND code, you should include the reason code.

You can also search the IBM and Tivoli databases available on the World Wide Web at **http://www-4.ibm.com/software/support/** and **http://www.tivoli.com/support/**.

For most other problems, the symptoms produced by the system and the name of the function being used are enough to perform an effective search. For example, assume that garbled data is displayed when you are using the STATISTICS command. The search

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argument of INCORROUT (or, for example, GARBLED, BAD, or INCORRECT DATA) and the STATISTICS command are probably enough to retrieve a minimum of usable records from the problem database.

If the search does not yield a duplicate problem description, the problem can still be described in the problem database:

- The programming error might have a variety of symptoms. Try searching on just the function being performed or the system-produced symptom.

- If any PTFs have recently been applied, you can search on errors in the PTF.

If you are unable to find a duplicate problem, continue your analysis and gather additional documentation for the problem. The rest of this chapter describes the tools and procedures that you can use to do this.

How to Obtain a Dump

If you receive an ABEND, you should determine for which of the following the ABEND is received:

- a TSO user
- the BLX-SP
- a Tivoli Information Management for z/OS batch job
- a Tivoli Information Management for z/OS API application.

You should also determine whether the ABEND is a system ABEND or a user (Tivoli Information Management for z/OS) ABEND. To determine whether you are receiving a system ABEND or a user ABEND, view the SDSF log and locate the Symptom Dump Output for the ABEND received. A system ABEND will include the statement SYSTEM COMPLETION CODE = XXX (where XXX is the code number). A user ABEND will include the statement USER COMPLETION CODE=XXXX (where XXXX is the code number).

There are several ways in which a dump can be generated:

- User ABEND

  This is a dump generated by Tivoli Information Management for z/OS. You can look up these codes in *Tivoli Information Management for z/OS Messages and Codes*.

- System ABEND

  This is a dump caused by the MVS™ operating system. You can look up these codes in your MVS Messages and Codes Reference.

- FABEND

  This is a Tivoli Information Management for z/OS command that requests an immediate dump.

To obtain a dump, you must include a SYSUDUMP, SYSMDUMP, or SYSABEND DD statement in one of the following:
- Your logon procedure
- An ALLOCATE FILE(nnnnnnnn) statement in your command list if you run the product interactively, where nnnnnnnn is SYSUDUMP, SYSMDUMP, or SYSABEND DD
- The JCL if you are running in batch mode.

The SYSUDUMP statement requests a dump of the user area only. The SYSABEND statement requests a formatted dump of the user storage area and system storage areas. To request an unformatted, machine-readable dump of the system, include a SYSMDUMP statement. This dump can be formatted using the interactive problem control system (IPCS). Refer to the *OS/390 MVS JCL* guides or the *OS/390 MVS IPCS User's Guide* for more information.

Typically, Tivoli Information Management for z/OS support prefers using IPCS to review a SYSMDUMP. Allocate a Fixed Block (FB) data set with Record Length (LRECL) 4160 and Block Size (BLKSIZE) 4160. A reasonable DASD allocation for a TSO user dump is 50 cylinders primary 25 secondary. For a dump of the BLX-SP, 100 primary 25 secondary is reasonable. Specify a DISP (Disposition) of MOD in case more than one ABEND occurs in a row.

If it is recommended that you obtain a dump of the user area, the Tivoli Information Management for z/OS user will need to issue some commands from his TSO user ID or use a command list. Before you can allocate a data set using the TSO ALLOCATE command, you must first ensure that the data set represented by the SYSMDUMP statement is free. Issue the FREE command.

```
FREE FI(SYSMDUMP)
```

You can then allocate the SYSMDUMP data set with a destination specification. Issue the ALLOC command. You can include these statements in a command list.

```
ALLOC FI(SYSMDUMP) DA('your.dump.data.set.name') MOD
```

Once the SYSMDUMP is allocated to the TSO user's address space, have the TSO user recreate the problem.

If you are running Tivoli Information Management for z/OS in batch mode, you can include the DD statement in your JCL:

```
//SYSMDUMP DD DSN='your.dump.data.set.name',DISP=MOD
```

Then rerun the batch job to produce the dump.

If the BLX-SP is receiving the ABEND, allocate the dump dataset in the BLX-SP JCL:

```
//SYSMDUMP DD DSN='your.dump.data.set.name',DISP=MOD
```

Note: You will need to schedule a start and stop of the BLX-SP for this change to take effect.

If you cannot obtain a dump using one of these methods, you can use the MVS DUMP command to request an SVC dump; or, it may be necessary to obtain a SLIP from Tivoli Information Management for z/OS support in order to obtain a dump.

Using IDCAMS

IDCAMS is a catalog tool that processes several types of data sets, including VSAM data sets. With IDCAMS, you can copy or back up a Tivoli Information Management for z/OS data set as well as print all or part of a data set. You can use IDCAMS to:

- Verify a duplicate key or out-of-sequence key condition
- Verify that data does or does not physically exist in a data set
- Locate in a data set and verify a record or block of data that is in error

When you suspect that a data set contains information that is not valid or you receive error messages indicating that VSAM detected errors in one or more data sets, you can use IDCAMS to print selected portions to help you determine the nature of the error.

Note: Before taking any action to fix the data set, it is suggested that you run IDCAMS EXAMINE with INDEXTEST and DATATEST to determine if the data set is broken.

For example, if you receive message BLX03114I, BLX03118I, or BLX03188I, then VSAM has detected an error in a data set. The message indicates the data set name, the operation that was attempted, and the VSAM return codes and error-feedback codes from the operation. If the errors indicate an error in a particular record (designated by the first five bytes of the VSAM key), you can use the IDCAMS PRINT utility to print the records in question.

For information on how to run the IDCAMS utility, refer to the book *DFSMS: Access Method Services for VSAM Catalogs*. Also, the book *DFSMS: Macro instructions for Data Sets* explains these return codes, and the book *DFSMS: Using Data Sets* discusses defining and processing VSAM data sets.

If you are using several SDDSs, you should also know how they relate to each other. See "Database Architecture" on page 5 for this information.

Using VIEW INTERNALS

You use the VIEW command with the INTERNALS operand to display the internal structure of the data in a Tivoli Information Management for z/OS record, panel, or search argument. You receive a formatted view of data as it was collected interactively, or, in the case of a record display, as it was filed on the SDDS data set. From the information displayed, you can determine the physical content of a record. You need this information when you are trying to determine the cause of data-related problems. You should use VIEW INTERNALS whenever you suspect data content is causing a problem with report output, display output, or record processing, such as panel flow or dialog errors.

If you suspect problems when the record is being filed, you can issue VIEW ON to see a view-internals display, showing how the record appears before and after the data is compressed.

You can use VIEW INTERNALS to verify that specific s-word and p-word information exists in a record and to verify the control information for a data-entry field.

View Internals Display Format

VIEW INTERNALS displays information that was collected by panels and stored in the SDE (structured description entry) data area. This is an example of a View Internals display.

```
BLG1TVID                    VIEW INTERNAL DATA              LINE 1 OF 24

PANEL    PANEL  REL COG-  FLAGS    SWORD  STRUCTURED   PREFIX WORD OR
NAME     TYP/RSP LEV NIZE F  M  D  INDEX     WORD      VISIBLE PHRASE

BLG0EN20 D/ 5   12  B/   18/00/88  S002C  BA //S/TSI   ENTRY
SDDSROOT C/     12  N/   12/04/10  S0000                00000EBE
BLG00000 S/ 1   12  B/   18/04/08  S0032  BA //S/TXS   RECS=PROBLEM
BLG0B001 S/ 1   12  B/   19/00/00  S0CFC  BC IMDIAENT0 REPORTER
BLG0B100 D/ 1   12  N/   41/00/08  S0B59
BLG6REQN A/ 2   12  B/U  0D/04/00  S0B59  BC IM0I0PS00 PERS/POWELL
BLG0B100 D/14   12  N/   41/00/00  S0BEE
BLG6STAT A/ 2   12  B/U  0D/04/00  S0BEE  BC IMS0SSC00 STAC/OPEN
BLG0B100 D/25   12  N/   41/00/00  S0E0F
BLG6DSAB A/ 2   12  B/U  0D/04/00  S0E0F  BC IM0TXCA00 TEST PROBLEM
BLG0B100 D/ E   12  N/   01/00/0C  S000B
BLGSDBCP D/ 9   12  N/   19/00/5C  S0CF1  BC ISSCPN009 File record
BLG1A111 C/ 2   12  B/U  0C/00/00  S0C34  BC IM00SDC00 DATE/05/21/1997
BLG1A111 C/ 2   12  B/U  0C/00/00  S0C61  BC IM00STC00 TIME/17:52




 Type DOWN or UP to scroll the panel, or type END to exit the panel.

===>
```

Each data-collecting panel that is passed through in the dialog from which you issue VIEW INTERNALS is a line in the View Internal Data display. The second entry, identified in the panel name column by SDDSROOT, is provided only when a record is displayed or updated. The 4-byte internal root VSAM key of the record is displayed in the Visible Phrase column in hexadecimal format.

Note: If a field in the record has an authorization code associated with it, you cannot display that field with VIEW INTERNALS unless your user ID has master privilege class authority.

A description of the fields in the display follows:

PANEL NAME
Name of the panel.

> **Note:** This field can also be a program exit module name. For example:
>
> - BLGCEXDC is program exit BLG01439
> - BLGCOCOP is program exit BLG01273
> - BLGTSADD is TSP WORDFIX
> - BLGTXADD is TSX ADDSDATA
> - BLGCADRN is a file time PLX module
>
> Although this field is most often a panel name, if you find that the field data is not in one of the panel data sets, then you can assume it is a module name.

PANEL TYP/RSP
Type of panel and the response entered for the panel, as follows:

S   Selection panel

A   Assisted-entry panel

C   Control panel

D   Data-entry panel

5. Tools and Procedures

RELEASE LEVEL
>Release level of the panel

COGNIZE
>This field may contain two values separated by a slash (/). The first value may be either N (neither the s-word nor the p-word is cognized), B (both the s-word and the p-word are cognized), or P (only the p-word is cognized); following the slash (/) there may be another value: U (uppercase) or M (mixed case); if there is no value following the separator character, it means that the p-word is not being cognized or there is no p-word for the SDE. Consider these examples:

>**N/** Neither the s-word nor the p-word is cognized

>**B/** Full cognizing, but no p-word exits

>**B/U** Full cognizing, upper case

>**P/M** Mixed case, only the p-word is cognized

FLAGS
>Flags within the SDE, as follows:

>**F** Common flags

>**M** Maintenance flags

>**D** Dialog flags

>These flags are defined in Table 3.

S-WORD INDEX
>The s-word index used to retrieve s-words from the dictionary.

STRUCTURED-WORD
>The s-word from the panel.

PREFIX-WORD OR VISIBLE PHRASE
>For selection or data-entry panels, the visible phrase from the panel; for assisted-entry panels and some control panels, the p-word associated with a field.

Table 3. Bit Mapping for SDE Flags

Flag	Bit Position								Description
F	8	4	2	1	8	4	2	1	Common flags
	1	•	•	•	•	•	•	•	Entry is administrative item
	•	1	•	•	•	•	•	•	Branch and link specified on this panel
	•	•	1	•	•	•	•	•	Reserved
	•	•	•	1	•	•	•	•	Visible phrase present
	•	•	•	•	1	•	•	•	S-Word present
	•	•	•	•	•	1	•	•	Prefixed data present
	•	•	•	•	•	•	1	•	Delete this entry
	•	•	•	•	•	•	•	1	Replace previous response
M	8	4	2	1	8	4	2	1	Maintenance flags
	1	•	•	•	•	•	•	•	Reserved
	•	1	•	•	•	•	•	•	Data collected in fix panel
	•	•	1	•	•	•	•	•	Data collected in PDAID panel

Table 3. Bit Mapping for SDE Flags (continued)

Flag	Bit Position								Description
	•	•	•	1	•	•	•	•	Data collected in symptom panel
	•	•	•	•	1	•	•	•	Data collected in circumvention section
	•	•	•	•	•	1	•	•	Not allowed
	•	•	•	•	•	•	1	•	Data collected in create mode
	•	•	•	•	•	•	•	1	Data collected in inquiry mode
D	8	4	2	1	8	4	2	1	Dialog flags
	1	•	•	•	•	•	•	•	This begins a new dialog
	•	1	•	•	•	•	•	•	This ends a dialog
	•	•	1	•	•	•	•	•	Program exit that collected this data is revoked when this data is deleted
	•	•	•	1	•	•	•	•	No back delete over this item
	•	•	•	•	1	•	•	•	Panel displayed to user
	•	•	•	•	•	1	•	•	Override dialog end target panel
	•	•	•	•	•	•	1	•	Reserved
	•	•	•	•	•	•	•	1	Reserved

Control Information

The VIEW INTERNALS display lists the control information for the data at the time that it was entered into the record. If that control information has been modified since the record was created or last updated, update the record and re-enter these fields in order to replace the original SDE entries with the changed control fields.

For example, suppose you have updated a record to change the data in one of the fields. When the record is printed, however, the report outputcontains the original data for that field. A display of the record shows the updated data.

This problem might be caused by an error in the control information for that field. Display the record in question, and issue VIEW INTERNALS to determine the cause of the problem. Locate all occurrences of that data field that appear in the record. You might find two or more SDE entries for the same field, each with input data.

Inspect the common (F) flag byte in the VIEW INTERNALS display. One of the bits in this flag byte indicates the operation of the Replace previous reply function. If this bit is set on, any data entered in that field replaces the previous data-entry, and the filed record contains only one occurrence of the SDE for that field. If this bit is not on, however, the Replace function is not started. The display of the record will show the most recent update to the field, but any previous entries in the field will also be retained in the record.

The last occurrence of this field in the record might have the Replace previous response bit set on. If the previous entries were made while the bit was set off, however, this is shown in the VIEW INTERNALS display. This indicates that a panel change was made after the record was created or updated.

For more information, refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide*.

Locating the Root VSAM Key

You can find the root VSAM key for a non–SRC record by following these steps:

1. Display the record.

2. Issue the VIEW INTERNALS command.

3. Look in the PANEL NAME column for SDDSROOT. On the same line, in PREFIX WORD column, is the root VSAM key for the record.

In the example on page 40, the root VSAM key is X'000004A7'.

An SRC record is slightly different, however. To find the root VSAM key for an SRC record, do the following:

1. Issue the VIEW ON command.

2. Update the SRC record.

3. File the record.

4. Look in the PANEL NAME column for SDDSROOT. On the same line, in PREFIX WORD column, is the root VSAM key for the record.

5. Issue the INIT command to cancel the file.

Another way to determine the root VSAM key of an SRC record is to:

1. Issue the DELETE command for the record.

2. Issue the VIEW INTERNALS command.

3. Look in the PANEL NAME column for SDDSROOT. On the same line, in PREFIX WORD column, is the root VSAM key for the record.

4. Cancel the DELETE command.

Recovering Your Database

Database recovery really starts before you have any database problems. Backing up your database is an essential aspect of Tivoli Information Management for z/OS.

The best way to back up your Tivoli Information Management for z/OS database is by using IDCAMS REPRO on a periodic basis, for example, weekly. Use the SDLDS and BLGUT4 to capture the day-to-day changes to the database that occur between backups made using IDCAMS REPRO. When you define your SDLDS for this version of Tivoli Information Management for z/OS, allocate it with SHAREOPTIONS(1 3). Refer to the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference* for assistance in creating and using an SDLDS.

The standard recovery steps are:

1. Determine what is in error (SDDS, SDIDS, or SDLDS).

2. If the SDLDS is full, the BLGUT4 utility should correct this.

3. If the SDIDS is full, damaged, or the indexes in the SDIDS do not match the data in the SDDS, run the BLGUT1 utility.

4. If the SDDS is damaged, a complete recovery is probably necessary.

Refer to the *Tivoli Information Management for z/OS Operation and Maintenance Reference* for information on recovering data sets.

How Tivoli Information Management for z/OS Files Records

An understanding of what might be wrong with the database determines the steps you need to take to recover your damaged database. Many different symptoms can occur for conditions with the SDDS, SDIDS, and the SDLDS.

If your system is running with an SDLDS, when a user updates the database by filing or deleting a record, Tivoli Information Management for z/OS writes to the SDLDS first. Then, Tivoli Information Management for z/OS writes to the SDDS with the first byte of the root VSAM key being X'FF'. A record containing this X'FF' is called a *busy* record.

At this point, there is a copy of the old record on the SDDS, as well as the updated record. The updated record is the busy record, and it is not usable. After the X'FF' record is written to the SDDS, Tivoli Information Management for z/OS writes the cognized items of the record to the SDIDS. When this is completed, Tivoli Information Management for z/OS writes over the old copy of the record in the SDDS with the updated record and deletes the X'FF' record.

Now the record is on the database and can be used.

Testing Your SDLDS

The primary problem that occurs with the SDLDS is that it fills up requiring data to be moved from the SDLDS to another data set using the BLGUT4 utility. Refer to the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference* for complete information about this utility.

A quick test to determine the status of the SDLDS is to run DBCLEANUP. The number of SDLDS records available is one of the messages returned by DBCLEANUP. For more information about DBCLEANUP, refer to the *Tivoli Information Management for z/OS Program Administration Guide and Reference*.

If the SDLDS is full, run the BLGUT4 utility. While you are running this utility, no records can be created, updated, or deleted. When the utility finishes, try to update or file a record again. If the problem persists, the problem is probably in the SDDS or the SDIDS.

Testing Your SDDS

If you determine that your SDLDS is not full, or if you do not have an SDLDS defined, the database error could be in the SDDS.

If you can, issue the following search from your Management application Primary Options Menu (BLG0EN20):

```
SE ¬RNID/.
```

The search results display any busy or deleted records on the database. If so, you can attempt to recover them by using the DBCLEANUP function of Tivoli Information Management for z/OS. For more information about DBCLEANUP, refer to the *Tivoli Information Management for z/OS Program Administration Guide and Reference*.

Another problem you might encounter is records that are not being updated or that are being assigned duplicate RNIDs. If this is the case, run DBCLEANUP. If, after DBCLEANUP is complete, your records are still not being updated or you are still receiving duplicate RNIDs, there is a different problem with your SDDS.

If you run DBCLEANUP and it could not recover all records that need cleaning up, either the database or the volume it resides on might be full. Use LISTCAT to find the High Allocated RBA and the High Used RBA. (See the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference* for running LISTCAT and reading its output.) If the High Allocated RBA and the High Used RBA are almost equal, and there are *119 or more* extents, then the database is full. Use IDCAMS REPRO to back up the SDDS as follows:

1. Use the IDCAMS REPRO command to copy the SDDS to tape.

2. Delete and redefine the SDDS with additional candidate volumes, with a higher primary and secondary storage allocation, and/or on a volume that is larger than the previous volume.

3. Use the IDCAMS REPRO command to copy the SDDS back in.

If, by using IDCAMS EXAMINE, you determine that the database has out-of-sequence keys, do the following:

1. Use IDCAMS REPRO to move the SDDS data component to another data set.

2. Sort the sequential file by VSAM key (bytes 0-7 for 8-byte keys; bytes 0-6 for 7-byte keys).

3. Delete and redefine the SDDS and SDIDS.

4. Use IDCAMS REPRO to move the SDDS data component into the newly-defined SDDS. VSAM builds a new index for the records. This corrects the out-of-sequence condition. Then run BLGUT1 to rebuild the SDIDS.

Notes:

1. If you are using several SDDSs, you can determine the data set that has the bad record by the root VSAM key. Divide the root VSAM key by n (where n is the number of clusters). The remainder indicates which SDDS the record resides on. A remainder of zero resides in SDDS n. See "Data Set Structure of SDDSs" on page 8.

2. Typically, it is the DATA component of a VSAM cluster that runs out of space, but it also possible for the INDEX component to run out of space. Therefore, you should use LISTCAT to find the High Allocated RBA and the High Used RBA on both the DATA and INDEX components.

Testing Your SDIDS

The following occurrences generally indicate that the SDIDS does not agree with the SDDS, a problem which results in bad searches:

- `Record not found` messages appear

- The expected records do not appear in the search results list (SRL)

- Records appear in the SRL as "deleted"

Other problems occur when VSAM indicates that either duplicate keys exist or the keys are out of sequence. Another possible (but not common) error is that the SDIDS ran out of space. If you determine that the SDIDS is damaged, rebuild the SDIDS.

If the SDIDS does not agree with the SDDS and VSAM indicates that either duplicate keys exist or the keys are out of sequence, do the following:

1. Delete and redefine the SDIDS.
2. Run the BLGUT1 utility against the SDDS to build a new SDIDS.

If the SDIDS is out of space:

1. Use the IDCAMS REPRO command to back up the SDIDS.
2. Delete and redefine the SDIDS either with additional candidate volumes or on a volume that is larger than the previous volume.
3. Use the IDCAMS REPRO command to copy the SDIDS back in.

Note: Typically, it is the DATA component of a VSAM cluster that runs out of space, but it also possible for the INDEX component to run out of space. Therefore, you should use LISTCAT to find the High Allocated RBA and the High Used RBA on both the DATA and INDEX components.

Database Integrity

Tivoli Information Management for z/OS always tries to maintain database integrity. Records are validated before they are written to the SDDS to prevent unpredictable errors while reading records that might contain control information that is not valid. If a record cannot be read from the database, it cannot be deleted using the normal Tivoli Information Management for z/OS commands and functions because it must be read into storage to be deleted.

However, a system failure or other incident beyond the control of Tivoli Information Management for z/OS might result in one or more records that are not valid in the SDDS.

Deleting Records from the SDDS

The procedure outlined here describes a technique for deleting these records from the SDDS. The technique copies the entire SDDS (in several steps), except the records to be deleted, to another data set, and then copies the data set back.

Note: Before using the following technique, it is suggested that you run DBCLEANUP. Refer to the *Tivoli Information Management for z/OS User's Guide* for information on using DBCLEANUP. If DBCLEANUP resolves the problem, you may not need to perform the following steps.

To use this technique, proceed as follows:

1. Determine the keys of the error records. The keys of SDDS VSAM data sets are either seven or eight bytes long. The first 5 bytes of each VSAM record in the SDDS have the same value for a Tivoli Information Management for z/OS logical record. The first byte of the key indicates whether updating of the SDIDS was completed. If there exists a VSAM record with the high-order byte containing X'FF', the SDIDS was not updated completely and the records with a high-order byte of X'FF' must also be deleted. The next four bytes are the root VSAM key.

To delete a Tivoli Information Management for z/OS record from the SDDS, all VSAM records with the same root VSAM key for the logical record must be deleted. You must first free the data set. If you know the root VSAM key of the record, proceed to step 2. If you know the record ID for the record, you will have to determine the key of the SDDS VSAM record by using the VIEW INTERNALS command or by examining the text of a Tivoli Information Management for z/OS message.

2. Copy up to the record in error. This step copies the SDDS VSAM records from the beginning of the data set up to (but not including) the record in error. The AMS REPRO command is used to copy the records. This technique uses a sequential data set as the copy.

   The data set is allocated as a physical sequential data set (possibly a tape). You might supply certain DCB information for the sequential data set; however, you *must* supply the block size parameter. The block size that you specify must be at least four bytes larger than the maximum record size of the SDDS VSAM data set. Refer to the book *DFSMS: Access Method Services for VSAM Catalogs* for more information about copying SDDS VSAM data sets.

   So that copying will start at the beginning of the data set, do not specify the FROMKEY keyword on the REPRO command. The TOKEY keyword must specify a key of one less than the key of the record in error.

   For example, suppose the root VSAM key is X'000004D6'; the status part of the VSAM key is X'00'; the total length of the key is 8 bytes. The entire key of the error record is: X'00000004D6000000'. Therefore, the TOKEY value should be X'00000004D5FFFFFF'. If you are using multiple SDDS VSAM data sets, the record is located in SDDS VSAM data set 3. If you are using 7-byte keys, drop the last byte of X'FF' from the TOKEY value.

3. Copy from the record in error to the next record in error or to the end of file. Follow a procedure similar to that outlined in step 2. Remember, the output data set must be allocated with a disposition of **MOD** so that the records from the beginning of the SDDS VSAM data set are not over-written.

   This time, the FROMKEY *is* specified. The value is the next root VSAM key after the one in error. Using the example in step 2, the FROMKEY value is X'00000004D7000000'. If you are using 7-byte keys, drop the last byte of zeroes from the FROMKEY value. If there are no other records to be deleted, the TOKEY value need not be specified. If there are other records to be deleted, the TOKEY value must be specified as in step 2.

   Repeat steps 2 and 3 until all non-error records are copied.

   Note: If you are using multiple SDDS VSAM data sets, be *very* careful in performing this step. You must determine whether the next record in error is in the same SDDS VSAM data set as the previous one. You may only have to delete records from one SDDS VSAM data set, or you may have to delete records from more than one. For example, if you have five records with root VSAM keys in succession, you will have to delete one record from *each* of the five SDDS VSAM data sets. You can determine the data set that has the bad record by the root VSAM key. Divide the root VSAM key by n (where n is the number of clusters). The remainder indicates which SDDS the record resides on. A remainder of zero resides in SDDS n. See "Data Set Structure of SDDSs" on page 8.

4. Redefine the SDDS VSAM data sets. Use the AMS DELETE command to delete the original version of the SDDS VSAM data sets. Then redefine the SDDS VSAM data sets

using the AMS DEFINE CLUSTER command. You can use the same DEFINE CLUSTER command that you used when you first defined the SDDS VSAM data sets. Refer to the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference* for information on SDDS VSAM data sets.

> **Note:** You can, at this time, allocate different attributes for the SDDS VSAM data sets. For example, you might want to increase the space amounts. **However, do not reduce the maximum record size.**

5. Copy records back to the SDDS VSAM data sets. Use the AMS REPRO command again to copy the sequential data set into the new SDDS VSAM data sets. This time, do not use the TOKEY and FROMKEY keywords.

6. Rebuild the SDIDS using the BLGUT1 utility. Because an error record was in the SDDS, the SDIDS probably does not accurately reflect the contents of the SDDS. Therefore, you must rebuild the SDIDS using the BLGUT1 utility. Follow the procedure outlined in the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference* for rebuilding the SDIDS.

CAUTION:
The database can be damaged, unless you follow the outlined procedures carefully.

For example, suppose you are using one SDDS defined with an 8-byte key and records exist with a root VSAM key of X'000003AA'. Records exist with both a status X'00' (SDIDS updated) and X'FF' (SDIDS not updated). Therefore, both sets of records are to be deleted.

Sample Job Stream for MVS

This is a sample job stream for MVS that you can use to delete the records.

```
//DELETE   JOB  ...MSGLEVEL=1
//COPY1    EXEC PGM=IDCAMS
//COPY   DD   UNIT=3420,DCB=BLKSIZE=100000,DISP=(NEW,PASS),
//             VOL=SER=SCRTCH,DSN=COPY1
//SYSIN  DD   *
 /* ****************************************************************/
 /* COPY FROM BEGINNING UP TO FIRST ERROR RECORD.               */
 /* ****************************************************************/
 REPRO INDATASET(SYS1.INFO.SDDS)        +
    OUTFILE(COPY)                        +
    TOKEY(X'00000003A9FFFFFF')

 /* ****************************************************************/
 /* COPY FROM END OF FIRST ERROR UP TO SECOND ERROR RECORD.       */
 /* ****************************************************************/
 REPRO INDATASET(SYS1.INFO.SDDS)        +
    OUTFILE(COPY)                        +
    FROMKEY(X'000000039B000000')         +
    TOKEY(X'FF00000399FFFFFF')
 /* ****************************************************************/
 /* COPY FROM END OF SECOND ERROR RECORD TO THE END OF THE DATA SET. */
 /* ****************************************************************/
 REPRO INDATASET(SYS1.INFO.SDDS)        +
    OUTFILE(COPY)                        +
    FROMKEY(X'FF0000039B000000')
 /* ****************************************************************/
 /* DELETE THE SDDS IF THE COPY WAS SUCCESSFUL.                 */
 /* ****************************************************************/
 IF MAXCC = 0 THEN                      +
    DELETESYS1.INFO.SDDS
//COPY2    EXEC   PGM=IDCAMS,COND=(0,LT)
//COPY   DD     UNIT=3420,DCB=BLKSIZE=100000,DISP=(OLD,DELETE,KEEP),
```

```
                          VOL=SER=SCRTCG,DSN=COPY1
            //SYSIN   DD    *
              /* ****************************************************************/
              /* DEFINE THE SDDS DATA SET.                                    */
              /* ****************************************************************/
              DEFINE                                 +
                CLUSTER                              +
                    (NAME(SYS1.INFO.SDDS)            +
                    CYLINDERS(50 10)                 +
                    VOLUMES(111111)                  +
                    IMBED                            +
                    KEYS(7 0 )                       +
                    RECORDSIZE(4000 4089)            +
                    SHAREOPTIONS(1, 1)               +
                    SPEED                            +
                    UNIQUE                           +
                DATA                                 +
                    (NAMES(SYS1.INFO.SDDS.DATA)      +
                INDEX                                +
                    (NAME(SYS1.INFO.SDDS.INDEX)

              /* ****************************************************************/
              /* COPY THE DATA BACK TO THE SDDS                               */
              /* ****************************************************************/
              IF LASTCC = 0 THEN                     +
                REPRO INFILE(COPY)                   +
                 OUTDATASET(SYS1.INFO.SDDS)
```

Performing an Emergency Database Recovery when No Backup is Present

Normal database recovery is handled by BLGUT3/BLGUT4 or BLGUT23. The following type of recovery technique should be used only if no backup of SDDS is available or if you do not enough time to use the Tivoli Information Management for z/OS utilities. Be aware that using the Tivoli Information Management for z/OS utilities BLGUT3/BLGUT4 can take more time but guarantees that all records will be recovered. The following technique is faster but does *not* ensure that all records recovered.

This section provides some sample JCL to perform database recovery. The sequential data sets for the REPRO steps below are:

- dsorg = ps (sequential)

- recfm = vb (variable blocked)

- lrecl = cisisze of SDDS (usually 8192)

- blksize = cisize of SDDS + 4

Add these SORT fields to remove any possible duplicate VSAM keys:

- For a 7–byte key, use:

  ```
  SORT FIELDS=(5,7,BI,A)
  SUM FIELDS=NONE
  ```

- For an 8–byte key, use:

  ```
  SORT FIELDS=(5,8,BI,A)
  SUM FIELDS=NONE
  ```

The following sample is based on informational APAR II02490 and II08859.

```
//  REPOUT EXEC PGM=IDCAMS
//* REPRO JUST THE .DATA PORTION OF YOUR VSAM CLUSTER
//* THIS EXAMPLE USES SDDS CLUSTER WITH CISIZE OF 8192
```

```
|            //  SYSPRINT DD SYSOUT=*
|            //  INDD   DD DISP=SHR,DSN=your.sdds.cluster.DATA
|            //  OUTDD  DD DISP=(,PASS),DSN=&&UNSORT,
|            //         DCB=(RECFM=VB,LRECL=8192,BLKSIZE=8196),UNIT=SYSDA,
|            //         SPACE=(???,(??,??),RLSE)
|            //  SYSIN DD *
|                REPRO INFILE(INDD) OUTFILE(OUTDD)
|            //*
|            //*
|            //  SORTIT EXEC PGM=SORT,REGION=4M,PARM='SIZE(MAX),MSG=AP'
|            //* THIS EXAMPLE USES DF/SORT WITH A 7-BYTE KEY
|            //* THIS EXAMPLE USES SEQUENTIAL FILE WITH LRECL=8192,BLKSIZE=8196
|            //  SYSPRINT DD SYSOUT=*
|            //  SYSOUT DD SYSOUT=*
|            //  BLGSMSG DD SYSOUT=*
|            //  SORTIN DD DISP=SHR,DSN=&&UNSORT
|            //  SORTOUT DD DISP=SHR,DSN=&&SORTED,
|            //         DISP=(,PASS),
|            //         DCB=(RECFM=VB,LRECL=8192,BLKSIZE=8196),UNIT=SYSDA,
|            //         SPACE=(???,(??,??),RLSE)
|            //  SYSIN DD *
|            //  SORT FIELDS=(5,7,BI,A)
|            //  SUM FIELDS=NONE
|            //  RECORD TYPE=V
|            //*
|            //  REPIN EXEC PGM=IDCAMS
|            //* THIS EXAMPLE USES SEQUENTIAL FILE WITH LRECL=8192,BLKSIZE=8196
|            //* REPRO THE SORTED SEQUENTIAL FILE BACK INTO A VSAM CLUSTER
|            //  SYSPRINT DD SYSOUT=*
|            //  INDD DD DISP=(OLD,PASS),DSN=&&SORTED,
|            //  OUTDD DD DISP=SHR,DISP=your.new.sdds.cluster
|            //  SYSIN DD *
|            //  REPRO INFILE(INDD) OUTFILE(OUTDD)
|            //*
```

6

Contacting Tivoli

This chapter describes how to contact Tivoli for assistance if you cannot resolve your problems using the earlier diagnosis information in this book.

To contact Tivoli with a problem, do the following:

1. Collect your problem data and identify a possible cause for your problem.

2. Construct a *keyword symptom string*, a string of characters you send to Tivoli that provides information about the problem.

3. Determine if an APAR exists for the problem and obtain a fix if it exists.

4. If the problem is new, report it to Tivoli to obtain a fix.

In the United States and Canada, you can use IBMLINK to contact Tivoli. Outside the United States and Canada, use your local procedure to contact Tivoli. If an APAR does not exist for your problem, report the problem to Tivoli in one of two ways:
- Create an Electronic Technical Response (ETR) on IBMLINK.
- Call the Tivoli Software Support Center.

Note: Only people with a basic license for Tivoli Information Management for z/OS can contact or monitor contact with the Tivoli Software Support Center regarding problems. If you do not have this basic license, contact your system administrator or system programmer.

Collecting Information

Before you call Tivoli, collect some specific information and construct a keyword symptom string. These keywords are used by the Tivoli Support Center. (See "Contacting the Tivoli Software Support Center" on page 59.)

Before you call the Tivoli Software Support Center, make a copy of "Collecting Information About Your Problem and System" on page 83 for each problem, and answer as many of the questions on the form as you can.

Building a Keyword Symptom String

Structured search prefix words (p-words) are used to identify keywords in symptom strings. The symptom stringslook like this:

```
PIDS/569517100 LVLS/301 RIDS/xxxxxxxx PCSS/nnnn
PRCS/nnnnnnnn PRCS/nnnnnnnn MS/nnnnnnnn
```

Table 4 on page 54 lists the p-words and what they mean. To identify a specific type of error, add the p-words in Table 6 on page 55 to the above symptom string.

Table 4. Symptom String Keyword Definitions

Structured Search P-Word	Keyword Value	Description
PIDS/	569517100	The 9-digit component identifier assigned to Tivoli Information Management for z/OS
LVLS/	301	The 3-digit release number of Tivoli Information Management for z/OS
RIDS/	*xxxxxxx*	The name of the subcomponent (module or routine) that detected the error
PCSS/	*nnnn*	The line of code within the subcomponent (module or routine) that caused the error
PRCS/	*nnnnnnnn*	Tivoli Information Management for z/OS's primary return code associated with the error detected
PRCS/	*nnnnnnnn*	Tivoli Information Management for z/OS's secondary return code associated with the error detected
MS/	*nnnnnnnn*	The number identifying the messages used to present the error to the user, or additional information appropriate to the subcomponent that detected the error. This field is not always used.

See page "Determining Which Error Keyword to Use" for more information about structured search p-words.This section helps you locate suspected programming errors quickly, by using a systematic approach to identify the failing program component.

The value for some of the keywords is independent of the particular problem. For example, the value for the component ID does not require you to make a judgment; it is a given piece of information. For other keywords, you must make a choice of one value from several possibilities. The value you choose depends on the symptoms of the problem.

The structured search prefix and possible keyword values are listed for each type of keyword. Information to help you decide which keyword value best describes the error follows the keyword descriptions.

Identifying the Component ID and Release Keywords

The component ID identifies the Tivoli licensed program that failed. The release keyword identifies what version, release, and modification level of the program you are using.

The symptom strings contained in the trace logs created by Tivoli Information Management for z/OS automatically include the keywords shown in Table 5.

Table 5. Component ID and FMID Keyword Definitions

Structured Search Prefix	Keyword Value	Description
PIDS/	569517100	Component ID
LVLS/	301	Release number

Determining Which Error Keyword to Use

See page 53 for an explanation of structured search p-words. Other keywords (shown in Table 6 on page 55) identify a specific type of error. You can add as many of these keywords

as you need to the symptom string on page 53.

Table 6. Error Keyword Definitions

Structured Search Prefix	Keyword Value	Description
AB/	*Sxxxx*	A system ABEND has occurred in Tivoli Information Management for z/OS code.
AB/	*Uxxxx*	A user ABEND has occurred in Tivoli Information Management for z/OS code.
MS/	*xxxxxxxx*	The problem involves a Tivoli Information Management for z/OS message.
LOOP	LOOP	Tivoli Information Management for z/OS entered an endless loop.
WAIT	WAIT	Tivoli Information Management for z/OS entered a permanent task wait state.
INCORROUT	INCORROUT	The problem involves incorrect output data.
PERFM	PERFM	The problem involves performance.
PUBS/	*xxnnnnnnnn*	The problem involves printed or online information (helps and messages).

The following descriptions help you decide which of these keywords best describe the error.

AB (ABEND)

Use this keyword when program interruptions or ABENDs occur within Tivoli Information Management for z/OS. You can tell that one of these has occurred when:

- A message in a Tivoli Information Management for z/OS symptom string indicates that a program exception or ABEND occurred in a Tivoli Information Management for z/OS module.

- An MVS TSO/E message indicates that an ABEND occurred, and further analysis indicates the error occurred in Tivoli Information Management for z/OS.

Add either **AB/S***nnnn* or **AB/U***nnnn* to your keyword string, and replace *nnnn* with the ABEND number on the message, padded on the left with zeros to make it 4 digits long. Add the failing module name to your keyword. To identify the failing subcomponent (module or routine), add the name of the failing subcomponent to your keyword string using the prefix RIDS/.

For example, if a protection exception occurs (ABEND code of 0C4) in module BLGINIT1, add the following to your keyword string:

```
AB/S00C4 RIDS/BLGINIT1
```

If you cannot identify the module that caused the program interruption, do not use the **RIDS/** keyword but add the **AB/S***nnnn* or **AB/U***nnnn* keyword to your keyword symptom string. If you cannot identify the ABEND code that caused the program interruption, add **AB** (without the slash) to your keyword symptom string.

MS (Message)

Use this keyword if a Tivoli Information Management for z/OS message:
- Contains incorrect information

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- Does not have help available
- Is not generated when it should be
- Does not contain valid characters
- Is generated by conditions that should not cause it to be generated, or by conditions that should not occur.

Replace *xxxxxxxx* in *MS/xxxxxxxx* with the message number. Add the **MS/** keyword to your keyword string.

For example, if an error condition caused Tivoli Information Management for z/OS to issue message BLG19001I, add the following to your keyword string:

```
MS/BLG19001I
```

If you cannot locate the message number, add **MS** (without the slash) to your keyword symptom string.

Do not use this keyword to describe program interruptions or output that is not routed to the correct destination.

LOOP

Use the LOOP keyword if some part of the Tivoli Information Management for z/OS code is repeating endlessly.

In most circumstances, loop and wait states have the same characteristics:
- The display screen is not updated.
- The input inhibited indicator is not reset.

You can detect loops by:
- Examining traces for repeating patterns
- Consulting with host-system operations personnel about the status of various hardware indicators

The LOOP keyword does not have a value associated with it. For example, if the loop is within Tivoli Information Management for z/OS, add **LOOP** to your symptom string.

Do not use this keyword for an endlessly repeated message. Use the **MS/xxxxxxxxx** keyword instead.

WAIT

Use this keyword in either of two situations:
- When activity is suspended while waiting for some condition to be satisfied
- If Tivoli Information Management for z/OS appears to be waiting for some event that is unlikely to happen or does not seem to recognize the occurrence of an event for which it has suspended processing

Wait states can be indicated by certain messages returned to your screen and by consultation with host system operators. Unless you can determine that the wait state was caused by Tivoli Information Management for z/OS's requesting system services incorrectly, you should assume that the problem is a system error and refer to the appropriate system information about compiling a keyword string.

The WAIT keyword does not have a value associated with it. For example, if you determine that Tivoli Information Management for z/OS caused the wait, add **WAIT** to your keyword string.

INCORROUT (Incorrect Output)

Use this keyword when output is incorrect, missing, or erroneously repeated. Output includes:

- Data presented on the display or in a file
- Data saved in a record
- Incorrect search results

The INCORROUT keyword does not have a value associated with it. For example, if Tivoli Information Management for z/OS does not run correctly, producing incorrect output, add **INCORROUT** to your keyword symptom string.

Do not use this keyword for endlessly repeated messages. Use the **MS/xxxxxxxx** keyword instead. Do not use this keyword for return codes. Use the **PRCS/** keyword instead. (See page 53 for an explanation of the **PRCS/** keyword.)

PERFM (Performance)

Use this keyword to identify problems caused by Tivoli Information Management for z/OS performing below typical expectations. In addition, use this keyword if performance has been degraded as a result of applying a program fix.

The PERFM keyword does not have a value associated with it. For example, if you determine that Tivoli Information Management for z/OS is performing poorly, add **PERFM** to your keyword symptom string.

Do not use this keyword if the poor performance observed is the result of a problem in the programs or hardware prerequisite for Tivoli Information Management for z/OS.

PUBS (Documentation)

Use this keyword to identify documentation problems when they fall into one of the following categories:

- Documented descriptions of Tivoli Information Management for z/OS organization or operations do not match the actual organization or operation.

- Information that is essential to the installation, operation, or service of the Tivoli Information Management for z/OS licensed program is missing from the documentation.

- Information in the documentation is ambiguous and prevents the effective use of the Tivoli Information Management for z/OS program.

Select the correct keyword value from the list of publications in "Where to Find More Information" on page 93.

The keyword value for each book consists of the order number and the revision number of the book. Hyphens are not included as part of the PUBS keyword. The order and revision numbers appear on the front cover and on the title page of a book like this: xxnn-nnnn-nn, where xxnn-nnnn is the order number and nn is the revision number. (You *must* specify the revision number of your book in the keyword value.)

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For example, if you found an error within this publication, add the following to your keyword symptom string:

```
PUBS/SC34446000
```

Locate the error in the document and prepare a description of the problem it caused. The Tivoli Software Support Center representative will ask for this information.

If you do not know specifically which publication is involved, add **DOC** (*not* **PUBS**) with no keyword value to your keyword symptom string.

If you have suggestions, comments, or questions concerning a Tivoli Information Management for z/OS book, use the appropriate Reader's Comment Form at the back of each book.

Reporting a Problem to Tivoli

After you collect all pertinent information and construct your keyword symptom string, contact Tivoli to determine if Tivoli has a fix for the problem. If so, you can obtain the fix for the problem. If not, you can report the problem to Tivoli. In the United States and Canada you can contact Tivoli in one of two ways:

- By creating an Electronic Technical Response (ETR) on IBMLINK
- By calling the Tivoli Software Support Center

Outside the United States and Canada, use your local procedure to contact Tivoli.

Contacting Tivoli on IBMLink™

Software Support Center. If you choose to use IBMLINK, you should perform a Service Information Search (SRCHSERVICE) using your keyword symptom string.

If there is a match, you can obtain the fix through IBMLINK, as well. Create an Electronic Technical Response (ETR) to submit the problem to Tivoli. Include your keyword symptom string and a brief description of the problem.

Search Tips for Using SRCHSERVICE on IBMLink:

There are several keywords that are commonly used by the Tivoli Software Support Center. These keywords are helpful to you when you search for an existing problem. Add them to your symptom string when you contact Tivoli through IBMLINK. APAR written against it, use this keyword: GT0405. This keyword applies to this and all prior releases of Tivoli Information Management for z/OS. To search for a specific release, use the following keywords:

- For Version 6.3, use the keywords PIDS/569517100 LVLS301

- For Version 1.1, use the keywords PIDS/564814200 LVLS100

- For Version 1.2, use the keywords PIDS/564814200 LVLS200

- For Version 7.1, use the keywords PIDS/5697SD900 LVLS100

The Tivoli Software Support Center creates *informational* APARs that contain helpful information related to debugging and service. To search for these, use this keyword: **INFOINFO**.

You can search the PROBLEM DIAGNOSIS DATABASE; for Tivoli Information Management for z/OS problems that have been reported to the Tivoli Software Support Center. To search for these, use this keyword: **INFOPDDB**.

The Tivoli Marketing Support Centers (HONE, EQUAL) have announcements and questions and answers available. To search for these, use this keyword: **SMGT**. This keyword applies to this and all prior releases of Tivoli Information Management for z/OS.

Contacting the Tivoli Software Support Center

After verifying your account name, license number, and security code, the Tivoli Software Support Center arranges to have a Support Center representative work with you to determine the cause of your problem.

The Support Center representative requests:
- Information describing your problem and system
- The keyword symptom string that describes the problem
- Any other information that might be helpful in solving your problem

Obtaining a Solution

The Support Center representative uses your keyword symptom string to search the Software Support Facility in the Remote Technical Assistance Information Network (RETAIN®) to determineif your problem (or a similar one) has already been reported, and to determine if an APAR and fix have been developed for the problem. If a fix is found, the Support Center representative advises you on how to obtain it. If none is found, the Support Center representative passes your call on to a Tivoli Information Management for z/OS specialist.

The Tivoli Information Management for z/OS specialist assists you in obtaining additional information, if required. The Tivoli Information Management for z/OS specialist might also ask that this and other information you have collected be sent to them for further analysis. The Tivoli Information Management for z/OS specialist provides guidance in generating any additional information they need.

When necessary, the Tivoli Information Management for z/OS specialist prepares an APAR with your assistance to initiate the development of a fix for the problem. If an open APAR is found, the Tivoli Information Management for z/OS specialist will advise you when a fix is available.

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A

Problem Diagnostic Processes

This appendix contains the diagnostic processes introduced in Analyzing Problem Symptoms.

Unexpected Validation Messages

The following diagnostic process applies to validation messages that you received when entering specific values (assisted-entry panel responses in either create or inquiry mode). Perform the following steps to identify and solve validation problems:

1. Issue **;HELP VALIDATE** on the assisted-entry panel and verify that the validation patterns are specified correctly.

2. If you modified the panel, ensure that the panel being used when the message appears is the same panel you used when running under PMF. You might have forgotten to copy it to a read panel data set, or the panel data set concatenation might be different from what you think it is. You can use PMF panel list to verify this. Refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for more information.

3. If the message discusses the number of responses and the message was received in inquiry mode, then request the panel for update and examine the **Reply meaning** field (words or length) and the **Reply value** field (create and inquiry). Update these fields, if necessary, to ensure that the number of words allowed in a response is adequate to collect the data you need.

   Proceed to step 5.

4. If the message discusses the content of the response (for example, numeric or alphanumeric) then:
   a. Verify that the data type flag is appropriate for the type of data you expect this panel to accept.
   b. Compare the validation pattern in the assisted-entry panel with the **Reply value** and **Reply meaning** fields for the panel, verifying that they are not contradictory.
   c. If an = pattern is being used to collect data from the user's profile, ensure that the profile's assisted-entry panel validation matches the validation in the assisted-entry panel that contains the = pattern. Also, the = pattern must be first in the series of validations.

5. If the panel calls a program exit, look up the exit in the *Tivoli Information Management for z/OS Panel Modification Facility Guide* and ensure that the validation patterns (p-words) are the ones expected by the program exit. In addition, ensure that the proper mode and environment are called.

6. If the program exit requires other panels to be in the create or inquiry fields, ensure that this is performed according to the *Tivoli Information Management for z/OS Panel Modification Facility Guide*

Unexpected Dialog-Processing Messages

Use the following diagnostic process to analyze messages received when entering commands or panel responses. Refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for a description of dialog processing and a list of the function codes involved.

1. If you are not already looking at a View Internals display because of a dialog mismatch, issue **VIEW ON** and try to file the record to display the internal format of the record. See "View Internals Display Format" on page 40 for a description of the View Internals display format. From the display:

   a. Issue **PRINT ALL** from both the first and second display.
   b. Examine the first display.
   c. Use the printed output to determine the panel flow and dialog processing that occurred before the error message was issued. Print the panels that were involved in the panel flow to assist in diagnosing the error.
   d. If the previous step does not yield results, compare the printed output from the first display to the output from the second display and determine if some data has been compressed incorrectly. If this is the case, refer to rules for compression algorithms specified in *Tivoli Information Management for z/OS Panel Modification Facility Guide*.

2. Using the View Internals display, locate the first panel in the flow that contains a dialog-begin selection.

3. Follow the panel sequence until a dialog end is found for the dialog-begin selection.

4. Inspect the selection's control information to find the dialog-end-override indication. If it is there, continue with the next step; otherwise, go to step 7.

5. If **Override dialog end** is **YES**, the normal dialog-end processing (displaying the panel that began the dialog) is not followed. Instead, another panel, specified as the override target, becomes the current panel and is displayed.

   The overriding dialog target panel must also include a dialog-end specification; otherwise, the only way to end the dialog is for the user to enter a dialog-terminating command (**CANCEL** or **INITIALIZE**, for example). These commands cause a no-save exit from the panel; the overriding target panel is not displayed.

6. If the dialog-end indicator is specified in the overriding target panel, verify that the data is being saved as expected. If it is not, the dialog-begin and dialog-end indicators may mismatch, and you need to go to step 9.

7. The dialog-begin panel appears whenever you successfully complete a dialog. When you issue the **END** command, the system attempts to complete the current dialog. To ensure that the dialog is complete (required selections made, fields filled in), the following processing occurs:

   a. The current panel is scanned to determine whether any selection (or null reply) contains a dialog-end indication. If none is found, then a null reply is simulated. If the panel does not allow a null reply and the panel does not contain any dialog-end indications, you cannot end the dialog.

   b. If more than one selection, or both a selection and a null reply, are defined as ending a dialog, a message appears to inform you that a selection must be made. The system cannot assume a selection.

   c. If the current panel does not contain a dialog-end indication and a null reply is permitted, the system automatically enters a null reply, repeating the process until it finds a panel that contains a dialog-end indication.

8. When the system locates a dialog-end indication and detects that no override target is specified, it displays the panel from which the dialog began, unless you chain responses (**END,END,END,...**) or function code 0004 is being processed to create a record. In either of these cases, you proceed backwards, ending all dialogs, until the record can be filed.

9. A dialog end can cause information to be saved or canceled, depending on the function code associated with the selection. For example, a 000D function code represents the command **CANCEL**. If you enter **YES** in the **Dialog end** field and enter a function code of **000D**, the **END** command is treated as a **CANCEL**, and data is not saved.

10. You can also use function code **0010** for dialog-end processing. A **0010** function code in the null-reply control information for a panel lets the **END** command process the null-reply controls. However, the user cannot actually enter a null reply. This prevents an inadvertent dialog end but lets you enter the **END** command. No information is saved when the 0010 function code is used for dialog processing.

11. You can specify dialog-begin processing on options and data-entry panels or through a program exit. When reviewing the panel flow, ensure that you are aware of the program exits being used when you are setting up a dialog. If you are not sure whether the program exit does dialog-begin processing, look up the program exit in the *Tivoli Information Management for z/OS Panel Modification Facility Guide*

Unexpected Messages Generated during Panel-Flow Processing

Use the following diagnostic process to determine the cause of panel-flow-processing messages. In this context, panel-flow processing means identifying the next target panel based on a user's response to the panel. Other messages might be issued but are considered validation or program-exit related. Examples of the effects of panel-flow problems are missing panels and branch-and-link errors.

Panel-flow messages are generally caused by an incorrect target panel specification, by an incorrect panel data set concatenation, or by not copying a required panel to a read panel data set. Each of these is discussed separately.

1. Inspect the panel-flow-processing message.

   ■ If the message indicates a panel is not found or a panel is unknown, perform the following steps:

     a. Issue the **FLOW ON** command and repeat the sequence of events. The last panel on the **FLOW** output prior to the unknown panel is the calling panel.

     b. Ensure that the panel name being referred to exists. You might have made an entry error when typing in the target panel name.

     c. Ensure that the panel data set concatenation is correct. Use **PMF panel list** to ensure that the panel data sets are concatenated the way you think they are.

     d. If the panel data set concatenation is correct, ensure that the panel is in a read panel data set. You can determine this by selecting the appropriate panel data set or by requesting the panel for update with the specified panel data set label.

    e. If the message indicates that the missing panel is unknown, a blank target panel has been set. In this case, do the following:

- Request the calling panel for update using PMF.
- Examine the target panel associated with the selection or control line. If the target panel is a dual-mode panel, ensure that the create and inquiry target panels are appropriate to each mode. If the target panel is an assisted-entry panel and the **Return to caller** field is **YES**, make sure that a previous panel in the flow has the **Branch and link** field specified as **YES**.

- If the missing panel is a module name (indicated by a **BLGa**, where a is an alphabetic character rather than a number), a program exit might have been called incorrectly, or a problem has occurred with dialog cancel processing.

  You can issue the **FLOW ON** command and repeat the sequence of events to determine the panel that called the program exit. Look at the last panel in the **FLOW** output and work backwards until the program exit is found.

2. If the message indicates that there is a panel that is not valid in the panel flow, perform the following steps:

   a. The calling panel has set one of the following panel types as a target panel:

   - Table panel

     In this case, the panel cannot be processed if the appropriate function code or program exit was not specified.

   - Message panel

     This panel type is permitted as a target only in control panels.

   - Help panel

     You can use this panel type as a target only when the function code index is 0002.

   - Terminal simulator panel

     This panel type is permitted as a target only in control panels.

   To determine how the target panel is set, issue the **FLOW** command and repeat the sequence of events to determine the calling panel.

   b. Request the calling panel for update using PMF, and examine the control information associated with the selection or control line. Ensure that the program exits or function codes are correct.

3. If the message indicates a panel-flow error, it could be caused by one of two conditions. Follow these steps to identify and correct these problems:

   a. If a control panel was created incorrectly, update the control panel indicated in the message using PMF and correct the panel-flow processing controls.

   b. If an assisted-entry panel was found with the **Return to caller** field set to **YES** but no previous panel had **Branch and link** set to **YES**, examine the panel flow prior to the assisted-entry panel to determine where the **Branch and link** field should be specified. Or, turn off the return-to-caller indicator and set a target panel instead. Before doing this, run a **PMF Panel Cross-Reference** report to ensure that the panel is not used elsewhere in the flow. If it is, you might have to create a new assisted-entry panel.

Abnormal Rates: Looping

When the system gets into a loop, it can be one of two types:

■ A non-interactive loop, where a control panel is calling another control panel, which then calls the first control panel again.

■ An interactive loop, in which you cannot get out of a dialog.

To figure out how you got into a loop:

1. Obtain the name of the last panel displayed before looping started by issuing the **FLOW** command and repeating the sequence of events. Save a copy of the **FLOW** output.

2. Before you respond to the information requested by this panel, issue **VIEW INTERNALS** and then the **PRINT ALL**. The **VIEW INTERNALS** output is a list of all the panels processed prior to the occurrence of the loop.

3. Examine the target panel for the last panel displayed prior to the loop condition.

   ■ If the target panel is a control panel, perform the following steps:

      a. Examine the control panel, and determine its purpose. If the control panel performs a test, determine its target panels and examine each of those panels.

      The most likely problem is a control-panel processing loop, in which one control panel points to another control panel, which points to the first control panel. In this case, correct the target panels for one or both of the control panels and test the result.

      b. If a control line in the control panel calls a program exit, make sure the function of the program exit does not conflict with other program exits called elsewhere in the flow, either previously or subsequently, in another control line in the control panel or another control panel.

      Proceed to step 4.

   ■ If the response to the panel calls a program exit, perform the following steps:

      a. Verify that the program exit is being called correctly.

      b. Verify that the input to the program exit is correct. Examine an unmodified panel that calls the program exit. Run the Panel Cross-Reference report to find a panel that calls the program exit. Refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for details about common program exits and for instructions on running PMF reports.

4. If the response to the panel (or a subsequent panel, if the target is a control panel) interacts with dialog processing, an internal programming error has probably occurred. Have an operator cancel your Tivoli Information Management for z/OS session.

Access Validation (Authorization) Problems

Access to the internals of Tivoli Information Management for z/OS panels and other functions is subject to authorization, which is controlled by privilege classes and the panel architecture. The authorization code is the last four digits in an s-word. Even though Tivoli Information Management for z/OS uses only the last four positions of the s-word in the comparison, the entire s-word must be in the proper format. The *Tivoli Information Management for z/OS Panel Modification Facility Guide* describes the format of the s-word and gives more information about authorization codes. When you attempt to perform a given

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task or access a certain facility, Tivoli Information Management for z/OS compares the s-words contained in your privilege-class record with authorization codes defined in the various Tivoli Information Management for z/OS panels. If they do not match, you are not allowed to do the task or use the facility. In most cases, a message appears explaining that you are not authorized for whatever you were trying to do.

Your installation can define its own authorization, controlling access to the Tivoli Information Management for z/OS panels and facilities. To analyze problems associated with access to panels and other facilities:

1. Using PMF, request for update a panel that permitted or disallowed a selection, entry, or starting a control line. Examine the authorization code. If it is zero or blank and a message was issued stating that the user is not authorized, either the user has a different version of the panel, or an internal programming error has occurred. See "Missing or Obsolete Panels" for more information.

   If there is a code for the panel, ensure that it is correct and defined in your privilege-class records.

2. Display the privilege-class record and issue **VIEW INTERNALS**. Ensure that the record contains a **YES** for the appropriate s-word.

3. Compare the last four digits of the s-word for the appropriate authorization field in the privilege-class record to the authorization code in the panel. They must match.

4. Ensure that the s-word follows the correct format.

5. Ensure that the authorization s-word in the class record is unique (not used for several authorizations).

Missing or Obsolete Panels

If your installation has several panel data sets, the order in which they are defined in the BLGSES*nn* session parameters module can result in various symptoms. Follow these steps to ensure that the proper panel data sets are being used:

1. If Tivoli Information Management for z/OS cannot locate a panel, a message appears stating that the panel cannot be found, or the user is prompted for more information about the panel. If either of these applies, perform the following steps:

   a. If Tivoli Information Management for z/OS could not locate the panel during PMF panel update, do the following:

      1) Use the PMF Panel List to examine the current panel data set concatenation. Ensure that the panel data set names are correct and in the correct sequence. Select the panel data set where you expect to find the panel. If the panel is there, the problem was probably an internal error.

      2) If the panel cannot be located by Panel List, the panel might have been deleted from the specified panel data set, a VSAM error has occurred, or the panel is there but under a different name. View or print the panels in the specified panel data set to determine whether the panel exists under another name. Refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for instructions on using the PMF reports.

   b. If the panel is located during PMF panel update but is not available during Tivoli Information Management for z/OS panel-to-panel flow, the panel might exist in a

write panel data set but not in a read panel data set. Tivoli Information Management for z/OS obtains panels only from the read panel data sets unless you are using PMF panel update or test.

  1) Use PMF Panel List to determine the panel data set concatenation for the read and write panel data sets.

  2) Try to find the panel name by selecting the read panel data sets one by one. Then try to update it. If it can be obtained from the correct panel data sets, an internal logic error has probably occurred.

  3) If the panel cannot be located in a read panel data set concatenated during Tivoli Information Management for z/OS panel processing, copy the panel (use **PMF copy**) to the correct read panel data set.

2. When the wrong version of a panel is found, it implies that at least two copies of the panel exist. If this is the case, perform the following steps:

  a. Use the **PMF Panel List** to ensure that the panel data set concatenation is correct.

  b. Check each panel data set to determine if a previous copy of the panel is in a data set concatenated ahead of the one containing the correct panel. If you find a previous copy, you can use the delete line command function to remove the unwanted panel or you can rearrange the concatenation sequence in your BLGSES*nn* session parameters module.

  c. To compare the old and new panels to determine what has been changed and which one is actually correct, run a **PMF Panel Content** report for each one.

  d. Tivoli Information Management for z/OS uses panel buffers to minimize I/O to the panel data sets. When you are using PMF, panels you modify that exist in these buffers are marked out of date to force a read of the latest copy of the panel. However, if for some reason a panel is left in the buffers and the panel has been copied to a read panel data set, an internal logic error could cause the old copy to be presented during Tivoli Information Management for z/OS panel-to-panel flow. To verify a logic error, issue the BLX-SP operator command **REFRESH** to signal the BLX-SP to refresh all locally maintained panel buffers.

Missing S-Words Used by Program Exits

Many Tivoli Information Management for z/OS functions, especially program exits, use s-words from either the calling control line or from the current record to determine subsequent processing.

If they cannot locate the required s-words, one of two things happens:

- The program exit displays a message panel informing you that the exit was not called correctly.

- The program exit does not perform the requested function. This problem might not become apparent until the record is accessed or until a subsequent function is called.

The dictionary entries for s-words (and p-words) include the **Program Used** field, which contains **YES** if the s-word is used by a program exit or other Tivoli Information Management for z/OS function. In addition, the **General Comments** field in the dictionary

entry contains a description of the purpose of the s-word. This information can help you trace the use of an s-word and determine why the exit or other function was unable to locate it.

1. If a message is displayed, perform the following steps.

   a. Issue the **FLOW ON** command, and repeat the actions that caused the error. Look at the **FLOW** command output and, starting at the end of the list and working backwards, request each panel for update to find the one that calls the program exit. Refer to the *Tivoli Information Management for z/OS User's Guide* for more information on the **FLOW** command.

   b. Issue **CONTROL** or select the Summary update option to locate the control information for the calling control line.

   c. The program exit symbol is defined in the data-entry summary panel for panel-flow processing.

   d. Use the program exit symbol to locate the appropriate program exit description in the *Tivoli Information Management for z/OS Panel Modification Facility Guide*.

   e. Request a Panel Cross-Reference report for the base panel data set to locate Tivoli panels that call the program exit.

   f. Display or print one of the panels that call the program exit. The control information should contain the s-word required by the program exit. If it does not, refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for information about the program exit requirements.

2. If a required s-word was not located by a program exit but the user received no message or ABEND code, this is probably a Tivoli Information Management for z/OS programming error.

Data Missing from the SDIDS or a Database Record

Use the following diagnostic process to determine the cause of incorrect displays, search results, or report output. Generally, these types of problems can be broken down as shown in Table 7.

Table 7. Missing Data from the SDIDS or a Record

Symptom	Problem
Incorrect panel display, search results list, or report output	Data missing from the SDDS
Incorrect results from the SEARCH or REPORT command	Data missing from the SDIDS
History display or detail reports that do not reflect changes made to records	Data not journalized correctly
Text not displayed or printed in the requested report	Text-type data not identified correctly

Panel modifications could easily cause any of these problems; PMF provides several database interfaces. Refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for detailed discussions of these and related topics. Do the following:

1. Determine what data is missing from the SDIDS or a database record.

- If a word (a "word" can be an s-word, a p-word plus associated value, or freeform text) seems to be missing from a record, perform the following steps:

  a. Determine whether the SDDS is actually missing a field. Examine the panels to determine whether you can enter the value and, if so, how. Then proceed as follows:

  b. Use PMF to update the panel used to enter the word.

  c. Examine the control information to determine what type of data is being collected.

  d. Examine the **Replace previous reply** field. If it is specified as **YES**, only one occurrence (the last) of the selection or field is saved in the record.

  e. Examine the panel-flow processing summary to determine if function code index 000D is associated with any selection. This function code represents the CANCEL command, which does not save any data in the record.

- If a word is missing from the SDIDS, perform the following steps:.

  a. Ensure that the word missing from the SDIDS is contained in the corresponding SDDS record. To do this, display the record in question and issue **VIEW INTERNALS**. If the word is not shown, return to step 1a.

  b. If you can locate the word in the SDDS record on the **VIEW INTERNALS** display, find the name of the panel associated with the word.

  c. Use PMF to update the panel. The only time a word is not placed in the SDIDS is when the control line associated with that word has the **Cognize response** field set to **NO**. Ensure that **Cognize response** is specified as **YES**.

  d. If **Cognize response** is **YES**, ensure that the record was created using the panel you are examining: inspect the user panel data set concatenation to verify that the correct panels are being presented. See "Missing or Obsolete Panels" on page 66 for a related diagnostic process.

     Then, create another record to ensure that the word is placed in the SDIDS. If it is not, the SDIDS is out of synchronization with the SDDS — a condition that could be caused by a Tivoli Information Management for z/OS programming error. Run the SDIDS rebuild utility (**BLGUT1**) to correct the out-of-synchronization condition. Refer to the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference* for more information on rebuilding the SDIDS.

- If freeform text is missing, perform the following steps:.

  a. Request for PMF update the panel that calls the program exit to add user-entered text to the record.

  b. Examine the control line to determine the s-word associated with the selection. This s-word must match the one used for text display, and all appropriate report format table (RFT) statements.

  c. Examine the control line for the text display panel and ensure that its s-word matches the one in the previous panel.

  d. See "Abnormal Results" on page 18 for more information about freeform text display.

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■ If information is missing from the history display or report output, perform the following steps:

a. Ensure that the word missing from the history display is contained in the corresponding SDDS record. Display the record in question and issue **VIEW INTERNALS**. If the word is not shown, return to step 1a.

b. If you can locate the word in the SDDS record on the **VIEW INTERNALS** display, find the name of the panel associated with the word.

c. Use PMF to update the panel. Examine the **Journal** and **Journal Order** fields. If they are set correctly, ensure that the panel used to create the record is the same as the one you are looking at.

d. If all these items are correct and the problem is with report output, see "Incorrect Database Reports" on page 19.

e. Update the record using the correct panel from the read panel data set. Change the contents of the field and file the record. Display the record and select History. If the field is not displayed, and **Journal first** was specified, examine the internals of the history table panel to ensure that the s-word and p-word indexes in the appropriate column match what is being collected. If they do, an internal programming error has probably occurred.

Program-Exit Problems

PMF allows modification of the Program exit field in Tivoli-supplied panels as well as in your own. The program exits are identified by the symbols defined in *Tivoli Information Management for z/OS Panel Modification Facility Guide*.

Because users can access various Tivoli Information Management for z/OS functions through the program exits, you must ensure that any exit is used according to the specifications described in the *Tivoli Information Management for z/OS Panel Modification Facility Guide*. When exits are not called correctly, they cannot work correctly and can cause the Tivoli Information Management for z/OS programs to end abnormally. When you find a problem that might be connected with a program exit, follow these steps:

1. Use PMF to update the panel that calls the program exit.

2. Issue the **CONTROL** command for the control line calling the program exit. If necessary, select Summary from the Update Options panel to locate the program exit symbol. Regardless of panel type, the program exit symbol is specified under Panel Flow Processing.

3. Locate the program exit symbol in the *Tivoli Information Management for z/OS Panel Modification Facility Guide* to determine the purpose of the exit routine.

4. Ensure that the panel type being used to call the program exit is a valid panel type. For example, if a program exit is used to validate value definitions, such as date and time, it can be called only from an assisted-entry panel.

5. Ensure that the program exit is being called in the correct mode. For example, certain program exits can be called only in display mode (set when you enter the **DISPLAY** command) or after the **COPY** command.

6. Certain program exits use control information in the calling control line to determine what action to take, such as setting the next panel. Refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for the information on the appropriate program exit.

7. The PMF Panel Cross-Reference report lists, by program exit symbol (name), all panels calling a specific program exit. Use this report to examine the Tivoli-supplied panels that call the program exit, and compare the control information required by the program exit in the Tivoli panels to the control information contained in the panel causing the error. Refer to the appropriate panel flow to identify the dialog that contains the panel and the mode required for that dialog to be called.

8. If the input parameters for the program exit are correct and it is being called in the proper dialog and mode, an internal logic error has probably occurred.

Record-Access Problems

Control panels control access to all Tivoli Information Management for z/OS records used by interactive users. When a record is stored in the database, a test is made to ensure that the record-display panel is a control panel. When a record is accessed for COPY, DISPLAY, PRINT, UPDATE, or DELETE purposes, the record-access control panel determines the requested function, calls any appropriate program exits, and sets the target panel to be displayed.

Because the control panels control this process, modifications to a record-access control panel can result in incorrect processing for the record-access commands already mentioned. Perform the following steps to find and resolve record access problems caused by control panels.

1. Examine the record-access control panel associated with the record in question. This panel can be determined by examining the target panel for the File selection (function code 0004). This control panel should have a function code index of 002A with an appropriate p-word index for the record-access command (DELETE, PRINT, UPDATE, COPY, DISPLAY).

   Examine other Tivoli Information Management for z/OS record-display control panels to ensure that this control panel is constructed correctly.

2. Parent/child record relationships (such as change and activity records) have program exits for COPY and DELETE. Ensure that these program exits are being called correctly.

3. When a record is filed, a test is made to ensure that the record- display panel is a control type panel. However, you might have changed it to another panel type, such as a data-entry panel, after records have been filed. If this is the case, every record-access command results in the same panel being displayed.

   If this occurs, recreate the original control panel or delete the record. Through the Utilities selection on the System Application or Management Application primary options menus, you can bypass normal record verification and processing for the DELETE command. You can use this interface to delete records regardless of the record- access control panel and any authorization.

4. If the record-access control panel is incorrect, correction of the panel should also correct the record display problem. You can test this by copying the record-access control panel to a read panel data set and issuing the appropriate record-access command.

5. Authorization for record display is also controlled by the record- access control panel (with the exception of the MASTER privilege class and the unconditional DELETE interface). If the authorization code in the control line that contains the 002A function code for the appropriate record-access command is incorrect, there should be an authorization error message. If you receive this message, correct the authorization code and ensure that the privilege class includes the authority to perform the specified function.

6. Finally, if access to one record is prohibited, the same problem might exist for other records of the same type. To search the record type in question, use other appropriate search arguments, such as date ranges, to determine other records that might be affected. The result of this search tells you whether deleting one incorrect record through the special DELETE interface is sufficient or not.

Problems with Application Select Panel

PMF allows modification of the application select panel (BLG00030). However, modification of this panel usually also requires modification of the Tivoli Information Management for z/OS application select control panel (BLG0ENTR) or the Integration Facility Product select control panel (BTN0ENTR). These two panels, and the assisted-entry panel that defines the default application for a user's profile, must be kept synchronized. Specifically, all s-words added for new application selections must also be added to the application select control panel. The visible phrase associated with the application selection must also be added to the dictionary for subsequent control-panel testing through function code 000E. Refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for more information about the function codes.

To check for errors after changing BLG00030:

1. Print the panel that you used to select an application.

2. Print the control panel that you used to set the primary options menu.

3. Print the Tivoli panel that you used to select an application (BLG00030).

4. Print the product control panel that you used to set the primary options menu (BLG0ENTR or BTN0ENTR).

5. Ensure that the s-words on the modified application selection panel match the s-words on BLG00030.

6. Ensure that the s-words on the control panel used to set the primary options menu are the same as those set by the application select panel.

7. Ensure that the visible phrases on the modified application select panel are the same as those in the primary options menu control panel.

8. If you have added new s-words and p-words, ensure that they are correctly defined in the dictionary.

9. Ensure that the validation patterns in the profile default application assisted-entry panel contain the same responses as the visible phrases on the application select panel. This might require updates to the message CSECT containing the default application names.

10. Compare your modified application-select and primary-options control panels to the Tivoli-supplied panels BLG00030, BLG0ENTR, and BTN0ENTR. The first control line in the modified control panel should call the same program exit symbol, with the target panels specified correctly.

11. Refer to the chapter on creating a panel set in the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for information on modifying the application select panel and the control panel that sets the primary options menu.

PMF Panel-Validation Problems

PMF does various kinds of validation processing to prevent your entering mutually exclusive fields and to ensure the integrity of the data passed to the panel processors. Whenever possible, PMF tries to alert you to a problem as you attempt to exit from a faulty panel or from a dialog, if the problem spans several panels.

For example, when you issue END from a Panel Flow Processing data-entry panel, PMF verifies that the next panel to be set has been defined — for example, as a target panel, or with a dialog-end indicator. On the other hand, if you have defined several control lines (begin and end multiple tests, for example), PMF does not validate what you have done when you try to file the panel.

In the case of validations performed during the CONTROL command dialog, control panels do the validating. This means that you can add your own validations or modify the sequence or method followed by the Tivoli-supplied validations. You can also modify the PMF data-entry panels associated with the CONTROL command dialog to fit your installation's needs. You can combine the Panel Flow Processing and Data Collection data-entry panels into one. However, you then have to modify the control panels that do the control-line validations; otherwise, the validations produce incorrect messages or not happen at all.

The validations that PMF does are based on the type of panel or dialog involved. Use the following general diagnostic process to ensure that the intent of the validations was not changed when you modified the PMF data-entry panels:

1. Print the Tivoli-supplied data-entry panels for the dialog in question.

2. Print the control panels that do the validations. You should be able to locate them by examining the null-reply target panel for each Tivoli-supplied data-entry panel.

3. Examine the control panel. Each control panel references additional control panels, which you must also print.

   Repeat steps 2 and 3 for each control panel associated with each Tivoli-supplied panel you modified.

4. Examine the control panels and find the s-words and p-words and their meanings. This is to help you understand the control-line validations.

   Every field in PMF is located using s-words. The control panels test for these s-words and then check the values, based on the p-word indexes.

   The majority of the control panels used to perform PMF panel validations use Apply NOT logic and Begin and End multiple tests. Refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for more information about these fields.

5. Compare the Tivoli-supplied control panels with the modified control panels. Although the tests can vary, the conditions being tested must be the same. For example, if function code 0008 (INITIALIZE command called) is defined for a selection, there should be no target panel set for that control line.

6. If you did not modify the control panels when you modified the PMF data-entry panels, validations have probably been lost. If this is the case, various panel-flow errors can occur when a panel is processed by the PMF panel processor. Start again with the Tivoli-supplied panels.

7. Refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for more information about control panel tests.

Problems with PMF Report Output

If you receive abnormal PMF report output, follow these steps to find the source of your problem:

1. Print the unmodified Tivoli-supplied table panels that you used to format the Panel Content report by requesting a Panel Content report of those panels. Rearrange the concatenation of panel data sets and restart Tivoli Information Management for z/OS. The data set containing the original Tivoli-supplied panels must be concatenated ahead of any containing modified panels.

2. Print the unmodified Tivoli-supplied control panels that you used to control the sections of the Panel Content report. Refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for lists and discussions of both the table panels and control panels.

3. Compare the control information supplied in the Tivoli table panels with that in the modified panels; they should be similar if not identical.

4. If sections of a panel are not printed in the Panel Content report, compare the s-words in the Tivoli-supplied panels to those in the modified control panels. The s-words must match. The PMF panel print (Panel Content) function uses s-words in the control panel for each panel type to determine which sections of the panels to print.

5. If column information for a specific field is not printed or the wrong information is printed, perform the following steps:

   a. Ensure that the s-words in the table panels used to format the reports correspond to those used by PMF when you update the table panels.

   b. Ensure that the length of the field in question is not too long to fit in the maximum width of the column. To do this, request for update the data-entry panel used to create the record and examine the externals of the panel. If necessary, ensure that the actual validation pattern in the assisted-entry panel for the field in question allows the same length as shown on the data-entry panel.

   c. Ensure that the column width permits correct display of the information. To do this, request the table panel for update via PMF and issue **FIELD SHOW** to display the attribute bytes for the column width. Ensure that the attribute bytes are specified correctly. Then issue **CONTROL** for the column in question and find the value specified in the **Maximum width** field. The maximum width can exceed the actual column width, but the column width cannot exceed the maximum width.

   d. The PMF panel print function uses the window display service to format the Panel Content report output through table panel columns. Refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for information on how window display works.

Problems with the Dictionary Display

The dictionary-display function of PMF uses a table panel to control the length and format of the dictionary records. You can modify this panel, but you cannot extend the maximum field length for a given field, because the records are mapped in a fixed-record format.

Because of the importance of the dictionary function to much of Tivoli Information Management for z/OS processing, the control information in the table panel is verified frequently and extensively. Any modifications that can affect the dictionary must be error-free for the display function to work correctly.

If your users receive an abnormal dictionary display, follow these steps to find the source of the problem:

1. Print a Panel Content report of the modified table panel.

2. Print the corresponding Tivoli-supplied table panel.

3. Examine the printouts from steps 1 and 2 to perform the following:

   - If information is missing from the dictionary display, perform the following steps:

     a. Ensure that the s-word in the Tivoli-supplied table panel is the same as the s-word in the modified table panel for the column in question.

     b. Ensure that the **Maximum width** field for the modified panel is not specified as zero.

     c. Ensure that the column width is defined correctly in the external field definition for the column not being displayed.

   - If information is truncated, perform the following steps:

     a. Ensure that the **Maximum width** field is specified correctly.

     b. Ensure that the column width is defined correctly in the external field definition for the column.

     c. If the column was defined as scrollable, the data might appear truncated, but you can issue **COLUMN SCROLL** to bring the rest of the data into view.

   - If a message stated that the table panel is incorrect, do the following:

     a. Ensure that the s-words for every column in both table panels match.

     b. The dictionary uses the target panel in the table panel's control information to identify the assisted-entry panel that validates each of the following fields:
        - S-word
        - P-word
        - Validation pattern.

        Ensure that the target panels are specified in the modified table panel for these columns.

   - Ensure that the same minimum field size is specified for both versions of the table panel.

Problems Displaying Data through Table Panels

Tivoli Information Management for z/OS functions use a table panel to display the data collected in records using selections, options, control, assisted-entry or data- entry (selection type) panels. In addition, table panels display the data collected in an SDE format from panel responses. Follow these steps to determine the cause of data missing from such a table panel display:

1. Display the record containing the information not being displayed on the table panel.

2. Issue **VIEW INTERNALS** followed by **PRINT ALL**, to print the View Internals display of the record.

3. Print, in a PMF Panel Content report, the table panel responsible for displaying the missing information. Ensure that the panel you print comes from the panel data set that contains the panel being used when the problem occurred.

4. Table panels use either an s-word or p-word to control the display of data in a given column. Therefore, locate the control information in the table panel for the column where the information should be displayed.

5. Compare the s-word or p-word in the table panel to that in the VIEW INTERNALS printout to ensure that they match.

6. If the s-words or p-words do not match, change one. Changing this control information can present a problem if information from other records can be displayed in the column in question. If this is the case, the problem with the p-word or s-word could affect the database. To determine if this is so, display one of the records for which data is displayed in the column, and issue VIEW INTERNALS. Examine the s-word or p-word for the field. Compare it to the record whose data is not being displayed. If they are different, you have a database ambiguity. You must change the table panel control information and update the records containing one or both of the s-words or p-words in conflict.

7. If the table panel is used by a program exit, such as for connectivity displays, refer to *Tivoli Information Management for z/OS Panel Modification Facility Guide* to see if the table panel can be modified at all.

Incorrect Panel Appears

Incorrect panels can have many causes. Chained panel responses, either in IRCs or SRCs, make problem determination more difficult because the error can occur near the front of the chain.

For example, a user enters 2,1,1,3, expecting to proceed through panels A, B, C, and D. The chain of responses actually goes through panels A, D, E, and F, but the user discovers a problem only when panel F appears instead of panel D. In this case, the problem occurs between the first and second panels.

When the panel displayed is not the one expected, follow these steps to find the source of the problem:

1. Issue the FLOW ON command and recreate the error to find the name of the panel preceding the one that was incorrect.

2. Use PMF Panel List to determine if the panel data set concatenation is correct. This tells you the names of the panel data sets in effect when the user received an incorrect panel and the order in which they are searched for a panel.

3. If a TSP is involved, examine it to determine if one of the following occurred:

   ■ If the control panel that issues the 001B or 002B function code index is part of a multiple-test begin/end group, the initialization of the TSP causes you to branch to the control line after the multiple-test end.

   ■ If one control panel calls two TSPs, or if two control panels with no intervening displayable panels each call a TSP, the second TSP runs *before* the first TSP.

   ■ The TSP is loaded but is not run until immediately before a panel is to be displayed. If you are using a 002B function code index on your file panel, the record is both filed and gone by the time the TSP runs.

4. To trace the flow of the TSP itself, either update the TSP to use the TRACE function or use the TRACE command. It is possible that you are getting an unexpected return code from a PROCESS function and are branching to your error target instead of proceeding to the next control line.

   Examine the type of the calling panel.

   a. If the calling panel is a selection or options panel, perform the following steps:

      1) Select the **SUMMARY** update option and issue **UPDATE** for the selection or option in error.

      2) Examine the control information to find the name of the panel set by the calling panel. The following fields are used in panel-to-panel processing:

         ■ Create and Inquiry targets

            These fields set the next panel. Ensure that the correct target panel is defined for both inquiry and create mode.

         ■ Dialog end

            If this field is specified as **YES**, see "Unexpected Dialog-Processing Messages" on page 62 for additional information.

         ■ S-Word index or Function code index

            If either of these fields calls a function code, refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* to ensure that the code is correct for the selection.

         ■ Program exit

            If a program exit is being called, refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* to ensure that the program exit is being called correctly.

      3) PMF does not let you file a selection or options panel until you specify the next panel to be called. The specification can be in the form of one or more target panels or function codes or a dialog-end indication. Request the panel set by the calling panel for update. If it is not the panel displayed to the user, an internal error has probably occurred. Go to step 5.

   b. If the calling panel is a data-entry panel, perform the following steps:

      1) Select the **SUMMARY** update option and issue **UPDATE** for the selection in error.

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2) Examine the control information to find the name of the panel set by the calling panel. The following fields are used in panel-to-panel processing:

- Target panel

  This field identifies the next panel in the sequence. For an input field, the target panel should be the assisted-entry panel used to collect the response and perform validation.

- Selection type

  If this is a selection without an input field, refer to the steps for selection and options panels previously described in step 4b. They are the same except that data-entry panels permit only one target panel.

3) PMF does not let you file a data-entry panel until you have specified the next panel to be called. The specification can be in the form of a target panel, or function codes, or a dialog-end indication. Request the panel set by the calling panel for update. If it is not the panel displayed to the user, an internal error has probably occurred. Go to step 5.

c. If the calling panel is an assisted-entry panel, perform the following steps:

1) Select the **Externals** update option and issue **CONTROL** from the externals display.

2) The following fields are used for panel-to-panel flow processing. Examine them to ensure that they are used correctly.

- Create and Inquiry targets

  These fields set the next panel in the sequence. Ensure that the correct target panel is defined for both inquiry and create mode.

- Dialog end

  If this field is specified as **YES**, see "Unexpected Dialog-Processing Messages" on page 62 for additional information.

- Return to caller

  If this field is YES, a panel that calls this one must have the **Branch and link** field set to **YES**. The panel processor returns to the last branch-and-link specification, regardless of whether it is in the calling panel. The problem might be in a previous panel.

- Program exit

  If a program exit is being called, refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* to ensure that the program exit is being called correctly.

- Null reply target

  This field sets the next panel to be displayed when the user enters a null response to the panel.

  Go to step 5.

5. Examine the type of the current panel. If the current panel is a table panel, perform the following steps:

a. Table panels are not processed by a common panel processor but are used by specific Tivoli Information Management for z/OS functions. If the incorrect panel is

interacting with a table panel when the incorrect panel is presented to the user, an internal error has probably occurred. Refer to step 7.

b. Line commands for search-results-list type table displays are processed in the same general way as are record-manipulating commands such as COPY, DISPLAY, and DELETE.

c. The dictionary and parent/child functions use the target panel in the table panel to determine specific panels for display. For more information, refer to the discussions of these functions in the *Tivoli Information Management for z/OS Panel Modification Facility Guide* and the *Tivoli Information Management for z/OS Problem, Change, and Configuration Management*.

6. If the current panel is a help panel, perform the following steps:

a. Select the **Externals** update option and issue **CONTROL** from the externals display.

b. Select the control line that is causing the display of an incorrect panel.

c. Examine the function code index and target panel specification. The target panel should be the name of the incorrect panel. If the field is blank, the function code index is responsible for the display of the next panel. Refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for descriptions of all the function code indexes.

7. If an incorrect panel appears in response to a command, perform the steps listed under the category for that command. The three general categories of commands are:

■ Dialog-processing commands

This category contains the following commands: BACK, CANCEL, or END. If an incorrect panel appears when one of these commands is issued, see "Unexpected Dialog-Processing Messages" on page 62 for a description of dialog-processing errors.

■ Record-manipulating commands

This category contains the following commands: DISPLAY, COPY, PRINT, DELETE, and UPDATE. Perform the following if one of these commands is involved:

a. When the command is issued, it and any parameters are parsed and verified by a data-entry panel before the record-access function is called. The data-entry panel and assisted-entry panels are the same as those used for the Utility selection from the Tivoli Information Management for z/OS Primary Options Menu.

If these panels are changed incorrectly, all record-manipulative commands fail consistently because they cannot pass validation. The result is what appears to be the display of an incorrect panel. For example, if your change to an update panel does not accept the UPDATE command, an unexpected panel appears when you issue the UPDATE command.

Note: The line commands for a search-results-list type panel do not proceed through these panels.

b. The panels used by these commands are set by control panels when the record is filed. All interactive access to the record is controlled by these panels. When a user issues a record-manipulating command, Tivoli Information Management for z/OS reads the record and sets the panel to be processed.

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    c. The access control panel examines the function being performed and sets the appropriate panel. In some cases, the record-access control panel sets additional control panels to complete the requested command. If the record-access panels have been inadvertently changed, they could be setting incorrect panels.

    Examine the original (Tivoli-supplied) panel-to-panel flow for problem records to see a correct sequence of control panels used for record access.

- Remaining commands

  These include all other Tivoli Information Management for z/OS commands. Generally, these commands use predefined panel names for their processing. If an incorrect panel is displayed because of the use of these commands, do the following:

  a. Request the panel for update.

  b. Examine the panel to ensure that it has not been changed. The panel could appear incorrect because it was copied over. If the panel is correct when viewed via PMF, a problem occurred in the panel load processor or its called services.

  c. If the panel is incorrect, restore it to its original state.

  d. The SEARCH command uses either the panel named when the TABLE command was issued, the default panel in the user profile, or a control panel to identify the search-results-list table panel on which to display a search results list. If the TABLE command was issued, an incorrect panel might have been specified. Reissue the **TABLE** command, naming the correct panel, or issue **TABLE RESET** to reset the panel to the default.

  Examine the user profile. An incorrect panel might be specified as the default search panel. If a default search panel is not named in the user profile, then the control panel might have been changed, causing the search results list to be displayed on an incorrect panel.

  e. Refer to the SEARCH and TABLE commands in the *Tivoli Information Management for z/OS User's Guide* for rules that determine which search-results-list table panel is used.

8. Examine the calling panel to determine whether it calls a program exit, and ensure that the exit is being called correctly. Refer to the *Tivoli Information Management for z/OS Panel Modification Facility Guide* for descriptions of the program exits used by Tivoli Information Management for z/OS functions.

Abnormal Rates: Poor Performance

Common panel changes normally do not significantly increase response time. However, the panel architecture does include interfaces to various Tivoli Information Management for z/OS functions through function codes and program exits. Depending on how the function codes and exits are used and how often, response times can show a slight increase. For example, if the program exit that verifies the existence of a record for the field entered (such as **Problem**, or **Change number**) is called for numerous fields, you might notice a lengthening of response time because of the I/O required to verify the record's existence over and over again.

More important to performance, however, is the number of allocated panel data sets and the size of the panel buffers allocated for the panel data sets. Therefore, if response time seems slow, consider the following panel-related actions.

■ Examine the data set concatenation. Increasing the number of data sets normally results in additional I/O, especially if the panel data set containing the majority of the panels is not first in the concatenation defined in the BLGSES*nn* Panel List.

■ The maximum size of the panel-data-set records used by VSAM can affect performance, especially if the size of the panel forces the creation of multiple physical panels. Refer to the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference* for details.

■ Examine the panel flow. Data-entry panels call assisted-entry panels for each field. If the assisted-entry panels call program exits, ensure that the exits are correct.

■ Allocating insufficient buffer space for all data sets results in too-frequent I/O when the panels are read. Refer to the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference* for suggestions on the allocation of buffers for all data sets.

Also, the following can contribute to poor performance:

■ Poor performance can be related to the database organization. How you defined such characteristics as control interval size, maximum record size, and free space when you create the SDDS and SDIDS can cause VSAM to take longer to locate records. Get statistics on your database by running the database analysis utilities, BLGUT20 and BLGUT21. Refer to the *Tivoli Information Management for z/OS Planning and Installation Guide and Reference* for detailed information.

■ If you are still unable to resolve performance problems, contact your system performance specialist for assistance in fine tuning your VSAM data set and the size and number of your LSR buffer for optimum performance.

A. Problem Diagnostic Processes

B

Collecting Information About Your Problem and System

Before you call the Tivoli Software Support Center, answer as many of these questions as you can.

- Did the error occur when you were installing the product or after you installed a PTF? If it occurred after you installed a PTF and the PTF included panels, run BLGUT6 after you install the PTF. If the PTF included changes to the dictionary, run BLGUT5 after you install the PTF.

- Have you successfully performed this identical action before?

- Is the problem intermittent, or can you recreate it? If you can recreate the problem, can you isolate the error to one specific command or action?

- Did you look at all messages that were issued? A plus sign (+) means more messages follow that you can display. Enter **HELP** to see them.

- Have you recently made any changes to the panels?

- Is the problem only with a single record or a group of records (such as all problem records or all configuration records)?

- What functions were you using (for example, SRC generate, search, report, update record)?

- What records or fields were accessed (for example, change or problem records, approver or status fields)?

- What panels were involved (for example, BLG0CU01)?

- Were you running interactively or in batch mode?

- Were you using the BACK or CANCEL commands?

- Were any user exits being used?

- Is the problem related to using a Tivoli Information Management for z/OS API or a Tivoli Information Management for z/OS client environment?

Keyword Symptom String

List your keyword symptom string data here:

- PIDS/5697SD9

- LVLS/120

- RIDS/_____
- PCSS/_____
- PRCS/_____
- PRCS/_____
- MS/_____
- MS/_____
- AB/S_____
- AB/U_____
- PUBS/_____
- LOOP
- WAIT
- INCORROUT
- PERFM

When you call Tivoli, have the following information readily available:

Your access code: _____

Your problem number: _____

Component ID: 5697SD9

FMID:

HOYB100

Tivoli Information Management for z/OS base code

HOYB101

Tivoli Information Management for z/OS HLAPI/CICS

HOYB102

Tivoli Information Management for z/OS AutoBridge

HOYB112

Tivoli Information Management for z/OS HLAPI/USS

JOYB103

Tivoli Information Management for z/OS English

JOYB104

Tivoli Information Management for z/OS Japanese

JOYB111

Tivoli Information Management for z/OS AutoBridge, English

JOYB113

Tivoli Information Management for z/OS TEC Event Adapter

JOYB114

Tivoli Information Management for z/OS Graphics

JOYB115

Tivoli Information Management for z/OS Tivoli NetView® Bridge Adapter

JOYB116

Tivoli Information Management for z/OS Non-Latin Alphabet

PUT Level: _____

What priority do you consider this problem?

- Priority 1 — The system is down or the database is unavailable.

- Priority 2 — The system is usable but operations are limited.

- Priority 3 — The problem is causing a minimal impact to operations.

- Priority 4 — A temporary circumvention to the problem has been found.

B. Collecting Information About System

C
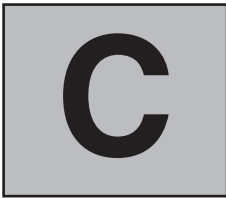
Relating Publications to Specific Tasks

Your data processing organization can have many different users performing many different tasks. The books in the Tivoli Information Management for z/OS library contain task-oriented scenarios to teach users how to perform the duties specific to their jobs.

The following table describes the typical tasks in a data processing organization and identifies the Tivoli Information Management for z/OS publication that supports those tasks. See "The Tivoli Information Management for z/OS Library" on page 93 for more information about each book.

Typical Tasks

Table 8. Relating Publications to Specific Tasks

If You Are:	And You Do This:	Read This:
Planning to Use Tivoli Information Management for z/OS	Identify the hardware and software requirements of Tivoli Information Management for z/OS. Identify the prerequisite and corequisite products. Plan and implement a test system.	*Tivoli Information Management for z/OS Planning and Installation Guide and Reference*
Installing Tivoli Information Management for z/OS	Install Tivoli Information Management for z/OS. Define and initialize data sets. Create session-parameters members.	*Tivoli Information Management for z/OS Planning and Installation Guide and Reference* *Tivoli Information Management for z/OS Integration Facility Guide*
	Define and create multiple Tivoli Information Management for z/OS BLX-SPs.	*Tivoli Information Management for z/OS Planning and Installation Guide and Reference*
	Define and create APPC transaction programs for clients.	*Tivoli Information Management for z/OS Client Installation and User's Guide*
	Define coupling facility structures for sysplex data sharing.	*Tivoli Information Management for z/OS Planning and Installation Guide and Reference*
Diagnosing problems	Diagnose problems encountered while using Tivoli Information Management for z/OS	*Tivoli Information Management for z/OS Diagnosis Guide*

Table 8. Relating Publications to Specific Tasks (continued)

If You Are:	And You Do This:	Read This:
Administering Tivoli Information Management for z/OS	Manage user profiles and passwords. Define and maintain privilege class records. Define and maintain rules records.	*Tivoli Information Management for z/OS Program Administration Guide and Reference* *Tivoli Information Management for z/OS Integration Facility Guide*
	Define and maintain USERS record. Define and maintain ALIAS record. Implement GUI interface. Define and maintain command aliases and authorizations.	*Tivoli Information Management for z/OS Program Administration Guide and Reference*
	Implement and administer Notification Management. Create user-defined line commands. Define logical database partitioning.	*Tivoli Information Management for z/OS Program Administration Guide and Reference*
	Create or modify GUI workstation applications that can interact with Tivoli Information Management for z/OS. Install the Tivoli Information Management for z/OS Desktop on user workstations.	*Tivoli Information Management for z/OS Desktop User's Guide*
Maintaining Tivoli Information Management for z/OS	Set up access to the data sets. Maintain the databases. Define and maintain privilege class records.	*Tivoli Information Management for z/OS Planning and Installation Guide and Reference* *Tivoli Information Management for z/OS Program Administration Guide and Reference*
	Define and maintain the BLX-SP. Run the utility programs.	*Tivoli Information Management for z/OS Operation and Maintenance Reference*
Programming applications	Use the application program interfaces.	*Tivoli Information Management for z/OS Application Program Interface Guide*
	Use the application program interfaces for Tivoli Information Management for z/OS clients.	*Tivoli Information Management for z/OS Client Installation and User's Guide*
	Create Web applications using or accessing Tivoli Information Management for z/OS data.	*Tivoli Information Management for z/OS World Wide Web Interface Guide*

Table 8. Relating Publications to Specific Tasks (continued)

If You Are:	And You Do This:	Read This:
Customizing Tivoli Information Management for z/OS	Design and implement a Change Management system. Design and implement a Configuration Management system. Design and implement a Problem Management system.	*Tivoli Information Management for z/OS Problem, Change, and Configuration Management*
	Design, create, and test terminal simulator panels or terminal simulator EXECs. Customize panels and panel flow.	*Tivoli Information Management for z/OS Terminal Simulator Guide and Reference* *Tivoli Information Management for z/OS Panel Modification Facility Guide*
	Design, create, and test Tivoli Information Management for z/OS formatted reports.	*Tivoli Information Management for z/OS Data Reporting User's Guide*
	Create a bridge between NetView and Tivoli Information Management for z/OS applications. Integrate Tivoli Information Management for z/OS with Tivoli distributed products.	*Tivoli Information Management for z/OS Guide to Integrating with Tivoli Applications*
Assisting Users	Create, search, update, and close change, configuration, or problem records. Browse or print Change, Configuration, or Problem Management reports.	*Tivoli Information Management for z/OS Problem, Change, and Configuration Management*
	Use the Tivoli Information Management for z/OS Integration Facility.	*Tivoli Information Management for z/OS Integration Facility Guide*
Using Tivoli Information Management for z/OS	Learn about the Tivoli Information Management for z/OS panel types, record types, and commands. Change a user profile.	*Tivoli Information Management for z/OS User's Guide*
	Learn about Problem, Change, and Configuration Management records.	*Tivoli Information Management for z/OS Problem, Change, and Configuration Management*
	Receive and respond to Tivoli Information Management for z/OS messages.	*Tivoli Information Management for z/OS Messages and Codes*
	Design and create reports.	*Tivoli Information Management for z/OS Data Reporting User's Guide*

C. Relating Publications to Specific Tasks

D

Tivoli Information Management for z/OS Courses

Education Offerings

Tivoli Information Management for z/OS classes are available in the United States and in the United Kingdom. For information about classes outside the U.S. and U.K., contact your local IBM representative or visit **http://www.training.ibm.com** on the World Wide Web.

United States

IBM Education classes can help your users and administrators learn how to get the most out of Tivoli Information Management for z/OS. IBM Education classes are offered in many locations in the United States and at your own company location.

For a current schedule of available classes or to enroll, call 1-800-IBM TEACh (1-800-426-8322). On the World Wide Web, visit:

http://www.training.ibm.com

to see the latest course offerings.

United Kingdom

In Europe, the following public courses are held in IBM's central London education centre at the South Bank at regular intervals. On-site courses can also be arranged.

For course schedules and to enroll, call Enrollments Administration on 0345 581329, or send an e-mail note to:

contact_educ_uk@vnet.ibm.com

On the World Wide Web, visit:

http://www.europe.ibm.com/education-uk

to see the latest course offerings.

E

Where to Find More Information

The Tivoli Information Management for z/OS library is an integral part of Tivoli Information Management for z/OS. The books are written with particular audiences in mind. Each book covers specific tasks.

The Tivoli Information Management for z/OS Library

The publications shipped automatically with each Tivoli Information Management for z/OS Version 7.1 licensed program are:

- *Tivoli Information Management for z/OS Application Program Interface Guide*
- *Tivoli Information Management for z/OS Client Installation and User's Guide* *
- *Tivoli Information Management for z/OS Data Reporting User's Guide* *
- *Tivoli Information Management for z/OS Desktop User's Guide*
- *Tivoli Information Management for z/OS Diagnosis Guide* *
- *Tivoli Information Management for z/OS Guide to Integrating with Tivoli Applications* *
- *Tivoli Information Management for z/OS Integration Facility Guide* *
- *Tivoli Information Management for z/OS Licensed Program Specification*
- *Tivoli Information Management for z/OS Master Index, Glossary, and Bibliography*
- *Tivoli Information Management for z/OS Messages and Codes*
- *Tivoli Information Management for z/OS Operation and Maintenance Reference*
- *Tivoli Information Management for z/OS Panel Modification Facility Guide*
- *Tivoli Information Management for z/OS Planning and Installation Guide and Reference*
- *Tivoli Information Management for z/OS Program Administration Guide and Reference*
- *Tivoli Information Management for z/OS Problem, Change, and Configuration Management**
- *Tivoli Information Management for z/OS Reference Summary*
- *Tivoli Information Management for z/OS Terminal Simulator Guide and Reference*
- *Tivoli Information Management for z/OS User's Guide*
- *Tivoli Information Management for z/OS World Wide Web Interface Guide*

Note: Publications marked with an asterisk (*) are shipped in softcopy format only.

Also included is the Product Kit, which includes the complete online library on CD-ROM.

To order a set of publications, specify order number SBOF-7028-00.

Additional copies of these items are available for a fee.

Publications can be requested from your Tivoli or IBM representative or the branch office serving your location. Or, in the U.S., you can call the IBM Publications order line directly by dialing 1-800-879-2755.

The following descriptions summarize all the books in the Tivoli Information Management for z/OS library.

Tivoli Information Management for z/OS Application Program Interface Guide, SC31-8737-00, explains how to use the low-level API, the high-level API, and the REXX interface to the high-level API. This book is written for application and system programmers who write applications that use these program interfaces.

Tivoli Information Management for z/OS Client Installation and User's Guide, SC31-8738-00, describes and illustrates the setup and use of Tivoli Information Management for z/OS's remote clients. This book shows you how to use Tivoli Information Management for z/OS functions in the AIX®, CICS®, HP-UX, OS/2®, Sun Solaris, Windows NT®, and OS/390 UNIX® System Services environments. Also included in this book is complete information about using the Tivoli Information Management for z/OS servers.

Tivoli Information Management for z/OS Data Reporting User's Guide, SC31-8739-00, describes various methods available to produce reports using Tivoli Information Management for z/OS data. It describes Tivoli Decision Support for Information Management (a Discovery Guide for Tivoli Decision Support), the Open Database Connectivity (ODBC) Driver for Tivoli Information Management for z/OS, and the Report Format Facility. A description of how to use the Report Format Facility to modify the standard reports provided with Tivoli Information Management for z/OS is provided. The book also illustrates the syntax of report format tables (RFTs) used to define the output from the Tivoli Information Management for z/OS REPORT and PRINT commands. It also includes several examples of modified RFTs.

Tivoli Information Management for z/OS Desktop User's Guide, SC31-8740-00, describes how to install and use the sample application provided with the Tivoli Information Management for z/OS Desktop. The Tivoli Information Management for z/OS Desktop is a Java-based graphical user interface for Tivoli Information Management for z/OS. Information on how to set up data model records to support the interface and instructions on using the Desktop Toolkit to develop your own Desktop application are also provided.

Tivoli Information Management for z/OS Diagnosis Guide, GC31-8741-00, explains how to identify a problem, analyze its symptoms, and resolve it. This book includes tools and information that are helpful in solving problems you might encounter when you use Tivoli Information Management for z/OS.

Tivoli Information Management for z/OS Guide to Integrating with Tivoli Applications, SC31-8744-00, describes the steps to follow to make an automatic connection between NetView and Tivoli Information Management for z/OS applications. It also explains how to customize the application interface which serves as an application enabler for the NetView Bridge and discusses the Tivoli Information Management for z/OS NetView AutoBridge. Information on interfacing Tivoli Information Management for z/OS with other Tivoli management software products or components is provided for Tivoli Enterprise Console, Tivoli Global Enterprise Manager, Tivoli Inventory, Tivoli Problem Management, Tivoli Software Distribution, and Problem Service.

Tivoli Information Management for z/OS Integration Facility Guide, SC31-8745-00, explains the concepts and structure of the Integration Facility. The Integration Facility provides a task-oriented interface to Tivoli Information Management for z/OS that makes the

Tivoli Information Management for z/OS applications easier to use. This book also explains how to use the panels and panel flows in your change and problem management system.

Tivoli Information Management for z/OS Master Index, Glossary, and Bibliography, SC31-8747-00, combines the indexes from each hardcopy book in the Tivoli Information Management for z/OS library for Version 7.1. Also included is a complete glossary and bibliography for the product.

Tivoli Information Management for z/OS Messages and Codes, GC31-8748-00, contains the messages and completion codes issued by the various Tivoli Information Management for z/OS applications. Each entry includes an explanation of the message or code and recommends actions for users and system programmers.

Tivoli Information Management for z/OS Operation and Maintenance Reference, SC31-8749-00, describes and illustrates the BLX-SP commands for use by the operator. It describes the utilities for defining and maintaining data sets required for using the Tivoli Information Management for z/OS licensed program, Version 7.1.

Tivoli Information Management for z/OS Panel Modification Facility Guide, SC31-8750-00, gives detailed instructions for creating and modifying Tivoli Information Management for z/OS panels. It provides detailed checklists for the common panel modification tasks, and it provides reference information useful to those who design and modify panels.

Tivoli Information Management for z/OS Planning and Installation Guide and Reference, GC31-8751-00, describes the tasks required for installing Tivoli Information Management for z/OS. This book provides an overview of the functions and optional features of Tivoli Information Management for z/OS to help you plan for installation. It also describes the tasks necessary to install, migrate, tailor, and start Tivoli Information Management for z/OS.

Tivoli Information Management for z/OS Problem, Change, and Configuration Management, SC31-8752-00, helps you learn how to use Problem, Change, and Configuration Management through a series of training exercises. After you finish the exercises in this book, you should be ready to use other books in the library that apply more directly to the programs you use and the tasks you perform every day.

Tivoli Information Management for z/OS Program Administration Guide and Reference, SC31-8753-00, provides detailed information about Tivoli Information Management for z/OS program administration tasks, such as defining user profiles and privilege classes and enabling the GUI user interface.

Tivoli Information Management for z/OS Reference Summary, SC31-8754-00, is a reference booklet containing Tivoli Information Management for z/OS commands, a list of p-words and s-words, summary information for PMF, and other information you need when you use Tivoli Information Management for z/OS.

Tivoli Information Management for z/OS Terminal Simulator Guide and Reference, SC31-8755-00, explains how to use terminal simulator panels (TSPs) and EXECs (TSXs) that let you simulate an entire interactive session with a Tivoli Information Management for z/OS program. This book gives instructions for designing, building, and testing TSPs and TSXs, followed by information on the different ways you can use TSPs and TSXs.

E. Where to Find More Information

Tivoli Information Management for z/OS User's Guide, SC31-8756-00, provides a general introduction to Tivoli Information Management for z/OS and databases. This book has a series of step-by-step exercises to show beginning users how to copy, update, print, create, and delete records, and how to search a database. It also contains Tivoli Information Management for z/OS command syntax and descriptions and other reference information.

Tivoli Information Management for z/OS World Wide Web Interface Guide, SC31-8757-00, explains how to install and operate the features available with Tivoli Information Management for z/OS that enable you to access a Tivoli Information Management for z/OS database using a Web browser as a client.

Other related publications include the following:

Tivoli Decision Support: Using the Information Management Guide is an online book (in portable document format) that can be viewed with the Adobe Acrobat Reader. This book is provided with Tivoli Decision Support for Information Management (5697-IMG), which is a product that enables you to use Tivoli Information Management for z/OS data with Tivoli Decision Support. This book describes the views and reports provided with the Information Management Guide.

IBM Redbooks™ published by IBM's International Technical Support Organization are also available. For a list of redbooks related to Tivoli Information Management for z/OS and access to online redbooks, visit Web site **http://www.redbooks.ibm.com** or **http://www.support.tivoli.com**

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Tivoli

File Number: S370/30xx/4300
Program Number: 5697-SD9