IBM IMS Buffer Pool Analyzer for z/OS
Version 1  Release 4

User’s Guide

IBM
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About this information

This documentation describes how to use the IMS™ Buffer Pool Analyzer for z/OS® (also referred to as Buffer Pool Analyzer). Buffer Pool Analyzer provides a methodology to help you tune IMS database buffer pools.

The information consists of the following chapters:

- A description of the product and its hardware and software requirements.
- Product installation procedures, (which begin in the Program Directory).
- The Buffer Pool Analyzer process for gathering trace data.
- The report generating process, including sample reports.
- The process of tuning an IMS database buffer pool.
- A description of the abend codes produced by the product.
- A list of the messages produced by the product.

Service updates and support information

To find service updates and support information, including software fix packs, PTFs, Frequently Asked Question (FAQs), technical notes, troubleshooting information, and downloads, refer to the following Web page:


Receiving information updates automatically

By registering with the IBM® My Support service, you can automatically receive a weekly e-mail that notifies you when new technote documents are released, when existing product documentation is updated, and when new product documentation is available. You can customize the service so that you receive information about only those IBM products that you specify.

To register with the My Support service:

1. Go to http://www.ibm.com/support/mysupport
2. Enter your IBM ID and password, or create one by clicking register now.
3. When the My Support page is displayed, click add products to select those products that you want to receive information updates about. The DB2® and IMS Tools category is located under Software -> Data and Information Management -> Database Tools & Utilities.
4. Click Subscribe to email to specify the types of updates that you would like to receive.
5. Click Update to save your profile.

Where to find information

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

www.ibm.com/support/docview.wss?uid=swg27020942
IBM Redbooks® that cover DB2 and IMS Tools are available from the following Web page:

www.ibm.com/software/data/db2imstools/support.html

**How to send your comments**

Your feedback is important in helping to provide the most accurate and high-quality information. If you have any comments about this information or any other IMS Buffer Pool Analyzer for z/OS documentation, use either of the following options:

- Use the online reader comment form, which is located at:
  www.ibm.com/software/data/rcf/

- Send your comments by e-mail to comments@us.ibm.com. Be sure to include the name, part number and version of the book and, if applicable, the specific location of the text you are commenting on (for example, a page number or table number).
Chapter 1. IMS Buffer Pool Analyzer overview

IBM IMS Buffer Pool Analyzer for z/OS (also referred to as IMS Buffer Pool Analyzer) provides a way to analyze database buffer pool performance for both IMS batch jobs (DLI and DBB) and IMS subsystems (DBCTL and DB/DC).

Topics:
- “What does IMS Buffer Pool Analyzer do?”
- “Performance management solutions” on page 3
- “Components” on page 4
- “IMS Buffer Pool Analyzer process flow” on page 4
- “Hardware and software prerequisites” on page 2
- “Buffer pool report definitions” on page 5
- “IMS Buffer Pool Analyzer publications and updates” on page 7
- “Accessibility features” on page 7
- “Summary of changes” on page 8

What does IMS Buffer Pool Analyzer do?

IMS Buffer Pool Analyzer provides more information than just IMS database buffer pool hit ratios and I/O rates. It provides a way to determine the impact of buffer pool changes before they are made.

Product features

IMS Buffer Pool Analyzer provides the following features:
- Reviews your buffer pool environment and recommends changes to the number of buffers in each subpool to improve performance. Specific recommendations are made for the number of buffers for each subpool, and the resulting change in storage usage and reduction in number of database reads.
- Provides information about the efficiency of OSAM cached buffers in a coupling facility (CF), and shows the effect of changing the amount of storage allocated to OSAM buffers in the CF cache structure.
- Reviews the databases that are allocated to each subpool and document subpools that include databases with I/O access ratios that are inconsistent, providing the information that you can use to change your subpool configuration.
- Identifies storage that is wasted because the most efficient buffer sizes are not available for database data sets.
- Determines if adding or subtracting buffers will improve the performance of a selected buffer pool.
- Models buffer pool usage to determine I/O rates for various numbers of buffers in each pool.
- Identify the databases that most heavily use each of the database subpools.
- Performs scenario analysis, including analyzing the impact of creating new buffer pools or changing the block size of a database.
- Reports on IMS OSAM, VSAM, and DEDB lookaside buffer pools, and IMS OSAM buffers that are cached in a coupling facility structure. The reports
provide information that is required to make informed decisions about implementing changes to the structure and sizes of your database buffer pools and the information that should be used with the tuning methods that are also described in this document.

- Requires no changes to any IMS control region or batch job during IMS Buffer Pool Analyzer installation. IMS can continue running while you are implementing the product. IMS Buffer Pool Analyzer dynamically accesses IMS data sets and control blocks from the trace address space to prepare to gather the information that is required to produce buffer pool reports.

**Product benefits**

IMS Buffer Pool Analyzer provides the following benefits:

- Eliminates guesswork when making changes to your buffer pool configuration so that you can understand the impact of changes to your system before you implement them.
- Reduces IMS outages that are needed to make changes to your buffer pool configuration and achieve your buffer pool tuning objectives without having to try one change, and then another, and so on.
- Reduces IMS real storage and virtual storage usage without the fear of severe impact on IMS performance and user response time. You can use IMS Buffer Pool Analyzer to model changes and see what the impact of subpool storage reductions will be before you implement changes.
- Determine which buffer subpools have the most space for additional storage and hence, will result in the highest reduction in I/O rate when the subpool is increased in size.
- Makes changes in your buffer pool configuration by adding and removing subpools or changing databases that are using subpools by understanding what the impact of the change will be on your system. IMS Buffer Pool Analyzer allows you to model different buffer pool configurations and see what the effect is on overall system performance.
- Balances your IMS subpools to improve individual database data set hit ratios. IMS Buffer Pool Analyzer identifies database data sets with much higher or lower hit ratios than other database data sets in each subpool. You can use this information to create new subpools that include database data sets that are more similar in access patterns and improve overall buffer pool performance.
- When making changes to your database access method or block size or CI size, you can model the changes and understand the impact of database changes on your buffer pool configuration. You can have IMS Buffer Pool Analyzer make recommendations on changes to your buffer pool configurations to accommodate the changes that are being made to your database data sets.
- Includes OSAM coupling facility caching information to allow you analysis of the benefit of caching OSAM buffers in a coupling facility.
- Provides support for IMS Tools Knowledge Base to store and retrieve IMS Buffer Pool Analyzer reports.

**Hardware and software prerequisites**

IMS Buffer Pool Analyzer operates on any hardware supported by IMS. IMS Buffer Pool Analyzer supports several IMS software releases that run on OS/390® or z/OS.
Complete information about installation requirements, prerequisites, and procedures for IMS Buffer Pool Analyzer is located in the Program Directory for IMS Buffer Pool Analyzer for z/OS.

**Hardware prerequisites**

IMS Buffer Pool Analyzer operates on any hardware that is supported by IMS.

**Software prerequisites**

IMS Buffer Pool Analyzer supports the following IMS releases running on z/OS V1R9 or higher:

- IMS Version 11
- IMS Version 12
- IMS Version 13

**Product installation**

The installation process allocates and populates two libraries required for product use:

- SBPLSAMP library, which contains sample JCL
- SBPLLINK library, which contains the executable programs

**Performance management solutions**

IBM solutions help information technology (IT) organizations maximize their investment in DB2 and IMS databases while staying on top of some of today’s toughest IT challenges. Performance management solutions can help maximize the productivity and profitability of your DB2 and IMS databases.

IMS Buffer Pool Analyzer provides the information that is required to determine whether changes to the buffer pool configuration would benefit your current IMS performance.

The following additional IMS Tools products also provide Performance management solutions:

- IMS Network Compression Facility
- IMS Performance Analyzer
- IMS Problem Investigator
- Tivoli® OMEGAMON® XE for IMS on z/OS

IMS Buffer Pool Analyzer performs the following functions:

1. Reviews your buffer pool environment
2. Recommends changes to the number of buffers in each subpool
3. Recommends the number of buffers for each subpool
4. Provides the resulting changes in storage usage
5. Provides the amount of reduction in the number of database reads
Components

IMS Buffer Pool Analyzer has two parts: a data gathering component, that uses the Generalized Trace Facility (GTF), and batch reporting components, that read the output from one or more data gathering traces.

The data gathering component uses the GTF to record database data set I/O activity. The GTF records that are recorded in IMS Buffer Pool Analyzer traces include:

- VSAM buffer trace records (GTF F61 records)
- IMS OSAM trace records (GTF F4F records)
- Buffer Pool Analyzer trace records (GTF 440 records)

Buffer Pool Analyzer trace records record information about DEDB lookaside buffer activity along with IMS buffer pool configuration information, including subpools, database data sets, coupling facility structures, and IMS options.

The batch reporting components provide batch reports that can be used to assist you in making changes to your IMS database buffer pools. The reports provide recommendations for buffer pool changes, and provides the details that were used to determine recommended changes.

In addition to making recommendations for changes in the number of buffers, the Buffer Pool report allows you to model changes to your buffer pool configuration. You can add new subpools and assign databases that will use the new subpools. These modeling abilities allow you make changes to your DL/I batch or IMS control region database buffer pools with confidence in the resulting performance.

IMS Buffer Pool Analyzer process flow

Collectively, the report types for IMS Buffer Pool Analyzer are OSAM, VSAM and DEDB lookaside buffer pools. Summary reports (included in the Buffer Pool report) provide recommendations for changes to your database buffer pool environment.

IMS Buffer Pool Analyzer has two parts:

- A data gathering component that uses the Generalized Trace Facility (GTF)
- Batch reporting components that read the output from one or more of the traces

The data gathering component uses GTF to record IMS subsystem configuration information and database data set buffer activity. Buffer Pool Analyzer uses GTF to record the following trace record types.

- VSAM buffer activity (GTF F61 records)
- IMS OSAM GTF trace records (GTF F4F records)
- Buffer Pool Analyzer trace records (GTF 440 records) which include IMS configuration information and DEDB lookaside buffer pool activity

GTF records this information in a trace data set, which is used by the modeling component to produce the database buffer pool modeling reports.

The batch reporting components provide batch reports that you can use to assist you in making changes to your IMS database buffer pools. The reports provide recommendations for buffer pool changes, and the details that were used to determine the recommended changes.
The following figure shows a diagram of the flow of data gathering in an IMS Buffer Pool Analyzer environment.

```
<table>
<thead>
<tr>
<th>IMS CTL or DLI</th>
<th>BPLGTF</th>
<th>BPLTRACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>O S A M</td>
<td>V S A M</td>
<td>D E D B</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMS DB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

*Figure 1. IMS Buffer Pool Analyzer process flow diagram*

**Buffer pool report definitions**

IMS Buffer Pool Analyzer uses several measures to analyze the performance of database buffer subpools. These measures are used in almost all reports and, because they are critical to understanding the data in the reports, their definitions are presented here.

**Requests per second**

The number of requests per second is an average for the number of database buffer requests generated by IMS. It includes only buffer requests that represent read activity; buffer write activity is not counted. The number of requests per second provides a way to compare subpool and database data set activity.

**Reads per second**

The number of reads per second is an average for the number of DASD I/Os required to fulfill the database buffer requests generated by IMS. The number of reads per second provides a way to compare the I/O rates for different subpools and database data sets.

**Hits per second**

The number of hits per second is an average for the number of database buffer requests generated by IMS that did not require any DASD I/O. The number of hits per second is calculated as the difference between the number of requests per second and the number of reads per second.
**Hit ratio**

The hit ratio for a database data set or subpool is the percent of database buffer requests that were satisfied from the buffer pool. That is, the percent of database buffer requests that did not require any I/O to fulfill. The figure below shows how the hit ratio is calculated:

\[
\text{Hit ratio} = \frac{\text{Number of requests} - \text{Number of reads}}{\text{Number of requests}} \times 100\%
\]

*Figure 2. Calculating the hit ratio*

**Buffer life**

Buffer life is the average length of time that a buffer remains in the buffer pool between requests for that specific block or CI. Buffer life reflects how quickly the buffers in a pool are discarded to make space in the pool for a new block or CI request. The figure below shows how buffer life is calculated:

\[
\text{Buffer life} = \frac{\text{Elapsed time} \times \text{Number of buffers}}{\text{Number of reads}}
\]

*Figure 3. Calculating buffer life*

Buffer life is not calculated for specific database data sets. It is an indication of how quickly buffers in a specific subpool are discarded, and is therefore only reported at the subpool level.

**Marginal reduction**

Marginal reduction statistics attempt to indicate the improvement in performance of a buffer pool. Marginal reduction is calculated only in the subpool models. Marginal reduction applies when changing the number of buffers from the prior row in the model to the current row; marginal reduction shows the number of DASD I/Os per hour that will be reduced per kilobyte (1024 bytes) of storage added to the buffer pool.

The figure below shows how marginal reduction is calculated:

\[
\text{Marginal reduction} = \frac{\text{Reduction in I/Os per hour (from the prior row)}}{\text{Increase in storage in KB (from prior row)}}
\]

*Figure 4. Calculating marginal reduction*

Marginal reduction is calculated so that you can compare the relative improvement in performance when adding buffers to a buffer pool. For example, assume that one subpool has a marginal reduction of two and another has a marginal reduction of 200. If the same amount of storage was added to each pool, the reduction in DASD reads for the second pool would be 100 times as great as the reduction in reads for the first pool.
IMS Buffer Pool Analyzer publications and updates

This topic explains where to find DB2 and IMS Tools information on the Web, and explains how to receive information updates automatically.

IMS Buffer Pool Analyzer information on the Web

The DB2 and IMS Tools Library Web page provides current product documentation that you can view, print, and download. To locate publications with the most up-to-date information, refer to the following Web page:

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

You can also access documentation for many DB2 and IMS Tools for z/OS from the Information Management Software for z/OS Solutions Information Center:

http://publib.boulder.ibm.com/infocenter/imzic

IBM Redbooks publications that cover DB2 and IMS Tools are available from the following Web page:

http://www.ibm.com/software/data/db2imstools/support.html

The Data Management Tools Solutions Web site shows how IBM solutions can help IT organizations maximize their investment in DB2 and IMS databases while staying ahead of today's top data management challenges:


Receiving updates automatically

To automatically receive a weekly email that notifies you when new DCF documents are released, when existing product documentation is updated, and when new product documentation is available, you can register with the IBM My Support service. You can customize the service so that you receive information about only those IBM products that you specify.

To register with the My Support service:
1. Go to http://www.ibm.com/support/mysupport
2. Enter your IBM ID and password, or create one by clicking register now.
3. When the My Support page is displayed, click add products to select those products that you want to receive information updates about. The DB2 and IMS Tools category is located under Software > Data and Information Management > Database Tools & Utilities.
4. Click Subscribe to email to specify the types of updates that you would like to receive.
5. Click Update to save your profile.

Accessibility features

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

The major accessibility features in IMS Buffer Pool Analyzer enable users to:
• Use assistive technologies such as screen readers and screen magnifier software. Consult the assistive technology documentation for specific information when using it to access z/OS interfaces.

• Customize display attributes such as color, contrast, and font size.

• Operate specific or equivalent features by using only the keyboard. Refer to the following publications for information about accessing ISPF interfaces:
  – z/OS ISPF User’s Guide, Volume 1
  – z/OS TSO/E Primer
  – z/OS TSO/E User’s Guide

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

### Summary of changes

**SC19-3980-00**

- Library names, member names, and JCL samples are updated following changes made for IMS Buffer Pool Analyzer V1.4.
- “Allocating data sets” on page 9 is updated.
- “Support for IMS Tools Knowledge Base” on page 13 is updated.
- Some messages are updated and new messages are added in Chapter 9.

**SC19-2718-0**

- Chapter 1, IMS Buffer Pool Analyzer overview has been reworked.
- New Chapter 7, Coupling facility IMS OSAM cache reports information was added.
- Allocating data sets, DASD information was added.
- Support for IMS Tools Knowledge Base, all new information was added to this revision.
- Generating buffer pool reports, new parameter information was added.
- Generating buffer pool reports, new parameters were added.
- Error messages were added.
Chapter 2. Customizing IMS Buffer Pool Analyzer

In order to run IMS Buffer Pool Analyzer effectively, you should customize it for your environment.

Topics:
- “APF authorization”
- “Allocating data sets”
- “Customizing the sample started tasks” on page 10
- “Security requirements for access to data sets” on page 12
- “Support for IMS Tools Knowledge Base” on page 13

APF authorization

The IMS Buffer Pool Analyzer library SBPLINK must be APF-authorized on each MVS™ system on which the data gathering component runs.

Allocating data sets

In addition to the data sets in the SMP/E maintained libraries, IMS Buffer Pool Analyzer requires two additional data sets: hlq.PARMLIB and hlq.TRACE. SBPLSAMP library member BPLALCDS contains a sample job to allocate these two data sets.

hlq.PARMLIB

The BPLTRACE started task populates this PDS with parameters used by the Generalized Trace Facility (GTF) during initialization. The data set needs only to be allocated properly before execution. See sample job BPLLCDS for the allocation parameters.

hlq.TRACE

The TRACE data set is used to collect GTF data. The trace data set name is specified in the BPLGTF PROC as well as in the report jobs. It is recommended that the data set be allocated without LRECL or BLKSIZE parameters, allowing GTF to choose optimal parameters based on the hardware on which the data set resides. See sample job BPLLCDS for the allocation parameters.

Space allocation is variable and depends on the:
- Length of time that GTF trace data is gathered
- Amount of database I/O performed by the job or IMS subsystem being monitored
- Amount of VSAM I/O activity on the MVS system

A busy IMS subsystem can easily fill a 1000-cylinder 3390 trace data set in minutes. Also, note that GTF uses no secondary space extents. When allocating the hlq.TRACE data set, ensure that you specify the CONTIG parameter in the SPACE= keyword of the DD statement.

If GTF fills a DASD trace data set, it wraps; that is, it writes over the beginning of the data set. It is important for the trace data set to be large enough to hold the entire trace.
You can avoid space problems, such as wrapping the trace data set and any impact on your DASD subsystem, by using tape for the GTF trace data. On a very busy system, tape output can be more efficient and reduce the chance that GTF may have to discard trace records due to a lack of GTF trace buffer space.

Customizing the sample started tasks

Two started tasks (tasks started by an operator command) are required for the data gathering component. Sample PROCs for the started tasks are distributed in the SBPLSAMP library.

About this task

The names of the sample PROCs are BPLTRACE and BPLGTF.

To customize the started tasks, follow these steps:

Procedure

1. Copy BPLTRACE and BPLGTF to a system PROCLIB data set known to JES for started tasks PROCs.

   You can change the names of the started task PROCs to conform to your installation's standards. The name of the BPLTRACE started task is used only in the operator command used to start the data collection process. If you change the name of the BPLTRACE started task, simply use the new name in place of BPLTRACE in the START command.

   The name of the BPLGTF PROC is specified in the BPLTRACE started task PROC. To change the name of the BPLGTF PROC, simply change the GTFPROC= keyword value from BPLGTF to the new name of the started task in the BPLTRACE PROC.

   The BPLGTF started task PROC must be reviewed and updated as described below. The next figure shows the distributed sample BPLGTF PROC.

   //BPLGTF PROC RGN=4096K,
   //       PARMLIB=BPL.PARMLIB,       DSN OF PARMLIB
   //       TRACE=BPL.TRACE,          DSN OF TRACE
   //       BLOK=256K,                AMOUNT OF ECSA TRACE RECORD STORAGE
   //       NCP=64,                  NUMBER OF CONCURRENT TRACE I/O
   //       SIZE='SIZE=4M'           ONLY VALID FOR z/OS 1.6 AND ABOVE
   ///*
   ///* This PROC is used by IMS Buffer Pool Analyzer.
   ///*
   //BPLGTF EXEC PGM=AHLGTF,REGION=&RGN,
   //       PARM='NOPROMPT,BLOK=&BLOK,SIZE'
   //SYSLIB DD DSN=&PARMLIB(BPLTRACE),DISP=SHR
   //IEFRDER DD DSN=&TRACE,DISP=SHR,DCB=NCP=*&NCP
   ///*

   Figure 5. Sample BPLGTF PROC

   where:

   **RGN** symbolic parameter

   The RGN symbolic parameter defines the region size used by the BPLGTF started task. The default value of 4096K should be sufficient for most installations.
PARMLIB symbolic parameter
This parameter defines the data set name of the PARMLIB data set whose allocation is described in "Allocating data sets" on page 9.

TRACE symbolic parameter
This parameter defines the data set name of the TRACE data set whose allocation is described in "Allocating data sets" on page 9.

BLOK symbolic parameter
This parameter identifies the amount of ECSA that GTF will use to store trace records before writing them to the trace data set. ECSA can range from 40K to 99999K.

Note: Ensure that the value specified will not cause a shortage of ECSA; otherwise, severe z/OS errors can result.
The sample PROC specifies BLOK=256K, which should be adequate for most installations. This value can be increased if GTF records are lost during the data gathering process, as reported in the GTF Trace report included in the report jobs.

NCP symbolic parameter
This symbolic specifies the number of channel programs that the output data set uses for the GTF trace data set. The value specified in the sample PROC of NCP=64 should be adequate for most installations. You can increase this value if GTF records are lost during the data gathering process, as reported in the GTF Trace report included in the report jobs.

SIZE= PROC symbolic parameter
This symbolic specifies the amount of GTF buffer space to be used and allocated in the private area of the BPLGTF started task. This symbolic can only be used only on a z/OS 1.6 or higher level MVS system. If you are running an earlier version of z/OS, specify SIZE= with no value in your BPLGTF PROC. For higher levels of z/OS, the value in the sample PROC of SIZE='SIZE-2M' should be adequate for most installations. You can increase this value if GTF records are lost during the data gathering process, as reported in the GTF Trace report included in the report jobs.

IEFRDER DD
This DD describes the data set used by GTF when writing trace records. If you choose to use a DASD data set for your trace data, the sample PROC can be used as distributed. If you choose to use a TAPE data set for your trace data, change the DD statement to allocate a new tape output data set. For example, you could change the IEFRDER DD to the following to use a UNIT name of TAPE as shown in the following figure:

```
//IEFRDER DD DSN=&TRACE,DISP=(NEW,CATLG),
// UNIT=TAPE, LABEL=RETPD=30,
// DCB=NCP=&NCP
```

Figure 6. Replacement IEFRDER DD when writing GTF trace to tape

2. Review and update the BPLTRACE started task PROC as described below. The next figure shows the distributed sample BPLTRACE PROC.
The RGN symbolic parameter defines the region size used by the BPLTRACE started task. The default value of 4M should be sufficient for most installations.

The SBPLLINK symbolic parameter

The SBPLLINK= value must specify an APF authorized library which contains the IMS Buffer Pool Analyzer load modules.

The PARMLIB symbolic parameter

The data set name must be changed to reflect the data set name specified in the BPLALCDS sample job (the hlq.PARMLIB data set).

The GTFPROC symbolic parameter

The name of the BPLGTF started task. The distributed name of the started task is BPLGTF. If you chose to change the name, as described in the preceding section, then update the BPLTRACE PROC to specify the PROC name you created.

The remaining symbolic parameters in the BPLTRACE PROC are typically supplied on the MVS START command. These parameters are documented in section “BPLTRACE started task parameters” below.

Security requirements for access to data sets

There are no security requirements for IMS Buffer Pool Analyzer other than typical data set access security requirements.

The BPLTRACE PROC requires:

- Update access to the PARMLIB data set.
- Control access to the RECON data sets used by the batch job or IMS subsystem being monitored.
- Read access to the active ACBLIB data sets used by any IMS subsystems to be monitored. For batch (DLI/DBB) jobs, ACBLIB access is not required.
The BPLGTF PROC requires:

- Update access to the TRACE data set specified in the IEFRDER DD statement in the PROC.
- Read access to the PARMLIB data set specified in the SYSLIB DD statement.

**Support for IMS Tools Knowledge Base**

If your installation currently uses the IMS Tools Knowledge Base (5655-R34), IMS Buffer Pool Analyzer can take advantage of the product's ability to archive and retrieve reports. The use of IMS Tools Knowledge Base is optional.

**About this task**

If you choose to use IMS Tools Knowledge Base, you must prepare the IMS Tools Knowledge Base repository for IMS Buffer Pool Analyzer reports.

To retain a history of IMS Buffer Pool Analyzer reports in IMS Tools Knowledge Base, use the product administration utility to define the report retention period. After IMS Buffer Pool Analyzer is registered, you can edit the report retention period. By default, the reports are retained for 30 days. A sample job is provided in the SBPLSAMP library. The following figure shows the sample job that is provided in the BPLITKB member of the SBPLSAMP library.

**Important:** Do not use the PRODUCTID=IB option when you register IMS Buffer Pool Analyzer with IMS Tools Knowledge Base. IMS Buffer Pool Analyzer is not defined in the default definition table, so only the most recent reports will be stored in the repository if you specify PRODUCTID=IB.
Note that in addition to updating the JOB card to meet your installation’s standards, you must supply appropriate values for the three symbolic variables.

**SBPLLINK** symbolic parameter

This symbolic must be set to the data set name of the IMS Buffer Pool Analyzer SBPLLINK library.

**SHKTLOAD** symbolic parameter

This symbolic must be set to the data set name of the IMS Tools Knowledge Base SHKTLOAD load library.

**ITKBSRVR** symbolic parameter

This symbolic must be set to the name of the IMS Tools Knowledge Base server.

You should expect to receive the following messages from execution of the first step in the above job.

HKT2178I Attempting to add an IBM product

HKT2158I Request completed successfully

These messages are expected and normal. The second step in the sample job lists the IMS Buffer Pool Analyzer definitions in the IMS Tools Knowledge Base repository. The output from this step will show the definitions as follows.
Any other messages that occur when defining IMS Buffer Pool Analyzer to the IMS Tools Knowledge Base should be reviewed using the IMS Tools Knowledge Base User’s Guide, SC18-9963.

In order to use IMS Tools Knowledge Base when creating reports, you must supply a PARM field in the report job step EXEC statement. The PARM field must specify the name of the IMS Tools Knowledge Base server. Further information can be found in “Generating the buffer pool reports” on page 30. If the ITKBSRVR specification is not included in the PARM of the report JCL, IMS Buffer Pool Analyzer will not archive report output in the knowledge base repository.
You gather trace data in order to discover the performance levels of your database buffer pools. This data is recorded in trace data sets and used to produce buffer pool modeling reports.

**Topics:**
- “How to gather data”
- “BPLTRACE started task parameters”
- “Controlling BPLTRACE” on page 19
- “Trace overhead” on page 21
- “Trace recommendations” on page 21
- “Combining multiple traces into a single report” on page 22

### How to gather data

The data gathering component of Buffer Pool Analyzer uses the GTF to gather data for modeling reports.

**About this task**

You can use multiple GTF trace data sets to generate a single report. When creating multiple trace data sets, the trace data must be consistent in order to generate a meaningful report.

When generating a report using multiple GTF trace data sets, the following information must be the same:

- Buffer pool definitions - This includes not only the same pool buffer sizes and subpool definitions, but the same number of buffers.
- Database definitions - This includes the number and names of the databases in the batch or online subsystem, the DD names associated with each DBD, block sizes or CI sizes, and the subpool assignments for each data set.

Use the BPLTRACE started task to initiate the data gathering component.

You can customize the BPLTRACE started task parameters in the started task PROC, or you can override them on the MVS START command.

### BPLTRACE started task parameters

To perform the task of gathering trace data, the BPLTRACE started task uses the following parameters: **IMSID**, **JOB**, **DT**, **WT**, and **GT**. There are four additional parameters in the BPLTRACE PROC that must also be specified, but these parameters (SBPLINK, PARMLIB, GTFPROC, and RGN) should be set in the actual PROC JCL, and should not need to be specified as part of the START command.

This section describes parameters for the BPLTRACE started task.
**IMSID**

The IMSID of an IMS DB/DC or DBCTL subsystem to be monitored. Either the **IMSID** or JOB parameter must be specified, but not both.

**JOB**

The name of an IMS batch (DLI or DBB region type) job to be monitored. Either the **IMSID** or JOB parameter must be specified, but not both.

**DT**

Delay time. The number of minutes to wait before starting to look for the IMS subsystem or batch job name. The number of minutes can range from 0 to 9999. Zero (or no specification) results in no delay time.

The DT parameter allows you to gather GTF data at a later time. For example, to gather data from an IMS control region during heavy nighttime BMP processing, start BPLTRACE at 4:00 p.m. with DT=600; this delays the start of GTF for 10 hours, until 2:00 a.m. the following morning.

**WT**

Wait time. The number of minutes to wait for the named JOB to start (after the delay time). The number of minutes can range from 0 to 9999. Zero (or no specification) results in no wait time.

When monitoring a DLI or DBB batch job, when BPLTRACE is started and the delay time has expired, it searches for an IMS batch subsystem with JOB=jobname specified. If the job name is not found, BPLTRACE searches the active jobs 10 times per minute until the wait time expires.

For example, to gather data for a DLI batch job that is expected to start four hours from the current time, use a WT=210 and DT=60. BPLTRACE will wait 3½ hours to begin looking for the job, and continues searching for the next hour. If the job is not found at the end of the WT period, BPLTRACE issues a warning message and ends.

**GT=**

GTF time. The number of minutes to gather GTF data. The number of minutes can range from 1 to 9999.

**Tip:** For batch DLI or DBB jobs, BPLTRACE stops the trace activity automatically when the job step ends.

## Examples of starting a trace

An MVS START command is used to start a data collection trace. The examples in this section show the **START** commands required to collect data.

These examples assume that the **SBPLINK, PARMLIB, GTFPROC, and RGN** parameters are set appropriately in the PROC.

### Examples

**Example 1**

Start collecting data immediately for an IMS subsystem with IMSID=IMSA. Collect data for 30 minutes.

```
START BPLTRACE,IMSID=IMSA,GT=30
```

**Example 2**

Collect data for an IMS subsystem with IMSID=IMSA. Begin data collection in 6 hours, and collect data for 20 minutes.

```
START BPLTRACE,IMSID=IMSA,DT=360,GT=20
```
Example 3
Collect data for a batch job named DLIJOB. The job is currently running.
Collect data for 60 minutes or until the job ends.
START BPLTRACE,JOB=DLIJOB,GT=60

Example 4
Collect data for a batch job named DBBJOB, which is expected to start in
60-90 minutes. Collect data for 120 minutes or until the first IMS step in
the job ends.
START BPLTRACE,JOB=DBBJOB,DT=60,WT=30,GT=120

Functions of the BPLTRACE started task
The BPLTRACE task starts and stops the GTF trace; it also collects data from the
target address space and passes the additional data to GTF.

Specifically, the BPLTRACE task performs these actions:
1. Waits for the delay time, if requested.
2. Searches for the target job or IMS subsystem.
3. If the target job is not found, retries the search every six seconds until the wait
time expires.
4. Builds GTF control cards based on the IMS environment.
5. Obtains configuration information from the target job or IMS subsystem,
   including DBD names, DD names, data set names, buffer pool allocation, and
   subpool-to-DBDNAME/DDNAME relationships.
6. Dynamically plants an intercept in IMS DEDB lookaside pool processing which
   creates a GTF trace record describing each DEDB buffer request, and whether
   the request was satisfied from memory or the coupling facility.
7. Starts GTF and verifies that GTF initialized successfully.
8. Traces the target job or IMS subsystem’s configuration information gathered in
   step 5 above.
9. After the GTF time interval completes or the batch job ends, turns off the IMS
   OSAM trace and stops the GTF address space.

Controlling BPLTRACE
The BPLTRACE started task can remain active for long periods of time, depending
on the delay time and wait time parameters you choose.

You can use the MVS MODIFY command to obtain the current status of the trace,
stop the trace, or bypass wait times requested at the start of the trace.

Obtaining the status of a trace
The BPLTRACE STATUS command provides output to the system console that
describes the status of the trace and how much time remains in the current state.

About this task
To obtain the status of a trace, perform the following steps:
**Procedure**

1. To obtain the status of a trace, issue the following MVS command: `MODIFY BPLTRACE, STATUS`
2. Verify the output. The following example shows the output of a `STATUS` command.

   ```
   F BPLTRACE, STATUS
   BPL063I TRACE REQUESTED FOR IMSID IMS8
   BPL066I IMS OSAMGTF TRACE STATUS: STARTED
   BPL067I GTF TRACE IN PROGRESS - 0006:52 OF 10 MINUTES REMAINING
   BPL068I IMS CONFIGURATION STATUS: COMPLETE
   BPL069I STATUS DISPLAY COMPLETE
   ```

   *Figure 9. Output of the STATUS command*

**Results**

The status report shown above indicates that the trace is in progress for IMS subsystem IMS8.

The configuration information has already been collected and recorded. Other status information might also appear as a result of the `STATUS` command. All messages that can be displayed in the `STATUS` report are described in the `Messages` section of this document. The section entitled "Functions of the BPLTRACE started task" on page 19 explains the information that is provided in the status report.

**Stopping a trace**

BPLTRACE can be stopped at any time, although if the trace is gathering configuration information, an abend might occur in the configuration subtask.

**About this task**

If the GTF trace has started and the configuration information is complete, stopping the trace provides a valid trace data set for use in reporting.

To stop a trace, complete the following steps:

**Procedure**

1. Issue the MVS `MODIFY` or MVS `STOP` command. The following list shows the MVS commands that you can use to stop the trace:
   - `STOP BPLTRACE`
   - `P BPLTRACE`
   - `MODIFY BPLTRACE, STOP`
   - `F BPLTRACE, STOP`

   Stopping the trace stops both the BPLTRACE address space and the BPLGTF address space (if it is active). If the GTF trace has started and the configuration information is complete, stopping the trace provides a valid trace data set for use in reporting.
2. Check the log to ensure that the trace was stopped with no errors.

**Bypassing the delay time**

If a trace was started with a delay time (DT=), the delay time can be bypassed.
About this task

For example, if a batch job starts before it was expected to start, and before the delay time expires, you can issue an MVS MODIFY command to bypass the delay and start the GTF trace.

To bypass a delay, issue the following MVS MODIFY command: 

```
F BPLTRACE,START
```

BPLTRACE immediately searches for the job and, once found, starts the GTF trace.

Trace overhead

Overhead is associated with gathering trace data for VSAM, OSAM, and DEDB I/O activity, as well as for gathering trace data for configuration information. The trace data set should be allocated on a volume that has no busy system data sets.

IMS Buffer Pool Analyzer uses established means to gather trace data.
- For VSAM I/O activity, VSAM GTF record collection for user F61 record types is used.
- For OSAM I/O activity, the IMS OSAM GTF trace is enabled, which generates GTF user F4F records.
- For configuration information and DEDB lookaside buffer information, the BPLTRACE task creates GTF user 440 type records.

The overhead of collecting OSAM/VSAM GTF data has been estimated at 5-10% of the CPU time for the tasks for which data is being collected. Additionally, there is I/O overhead to allow GTF to write trace records to the output data set.

Trace recommendations

The accuracy and usefulness of any report depends on the data gathered. Consider the points presented in this section when gathering trace data.

Sufficient trace data must be gathered. The time required to collect trace data varies based on I/O rates and on database I/O patterns.

It is important to not let GTF trace DASD data sets wrap because some IMS Buffer Pool Analyzer trace records could be lost.

To determine how quickly a DASD trace data set fills, you can use an MVS performance monitor to show how many I/Os occur to the IEFRDER data set of the BPLGTF started task. For a 1000-cylinder trace data set with half-track blocking, 30,000 I/Os would fill the trace data set.

For a batch job with consistent call patterns throughout the job, a 5-minute trace interval could provide more than enough trace data to produce valid reports and projections. On the other hand, an online IMS subsystem with hundreds of databases and I/O patterns that vary by time of day will require additional trace data.

Depending on the amount of DASD available for GTF trace data, an online IMS subsystem could be monitored for 10, 20, or 30 minute intervals. Because an online subsystem might have a batch workload occurring at night which has characteristics different from the daytime workload, several trace data sets should
be created for an online system. All the trace data sets can be included in a single execution of the reporting utility to produce projections that include the differing workloads.

To see differences in the projections by workload type, run separate reports with only one workload type included in the reporting job.

Trace data sets which are full can be copied to another DASD device or to tape by using the IEBGENER utility. You can then reuse the trace data set and reduce the amount of DASD space used for trace data.

If you experience any problems with DASD trace data sets, you can simply update the BPLGTF PROC to log the trace data directly to tape.

Combining multiple traces into a single report

When creating multiple trace data sets that will be combined into a single report, the trace data must be consistent to generate meaningful reports.

The information that must be the same includes:
- **Buffer pool definitions**
  - This includes not only the same pool buffer sizes and subpool definitions, but the same number of buffers
- **Database definitions**
  - Definitions include:
    - number and names of the databases in the subsystem (batch or online)
    - DD names associated with each DBD
    - block sizes
    - CI size
    - subpool assignments for each database data set

Also, ensure that you do not concatenate trace data sets in report JCL. Each trace data set you want to use as input to one of the report jobs must have a different DD name, each name starting with the word TRACE.
Chapter 4. Block Analysis reports introduction

Block analysis reports provide details about individual database block access requests.

The Block analysis reports can be used to review which blocks are most frequently referenced for each DBDS or subpool. This report information might be helpful when you review database access patterns, database organization, or randomizer effectiveness.

These reports were not designed to assist in the buffer pool tuning process, but they might be useful when you perform other tasks.

Topics:
- “Block analysis JCL”
- “Block analysis control statements” on page 25
- “Block analysis report formats” on page 25

Block analysis JCL

The Block analysis report uses the same trace data as the buffer analysis report that is produced by running the block analysis JCL.

The JCL to run the Block analysis report is described in this topic.

```
//BPLBLAN JOB
//*
// SET BPL140.SBPLLINK= DSN of BPA LOAD LIBRARY
// SET TRACE=BPL.TRACE TRACEDATA SET NAME
//*
//BPLBLAN EXEC PGM=BPLBLAN,REGION=64M
// STEPLIB DD DSN=&SBPLINK,DISP=SHR
// SYSPRINT DD SYSOUT=*  
//GTFRPT DD SYSOUT=*  
//DBDRPT DD SYSOUT=*  
//SPLRPT DD SYSOUT=*  
//SYSOUT DD SYSOUT=*  
//SYSUDUMB DD SYSOUT=*  
//BPLTEMP DD UNIT=SYSDA,SPACE=(CYL,(20,20))
//TRACE DD DSN=&TRACE,DISP=SHR,DCB=BUFNO=50
//SYSIN DD *
```

Figure 10. Block analysis JCL

The sample JCL that is shown above is included in the SBPLSAMP library in the member BPLBLAN. The DD names used by the Block Analysis report utility are described in the following list.

**STEPLIB**

Must reference a data set that contains the Buffer Pool Analyzer load modules.

**SYSPRINT**

Report output file. This is a required DD statement. The SYSPRINT file
contains error messages and any user specifications as supplied in the SYSIN DD statement. The DCB attributes of this output file need not be specified. They are set as LRECL=133, RECFM=FBA, and DSORG=PS.

**GTFRPT**
Report output file. If this DD statement is omitted, the trace file reports will not be produced. The GTFRPT file contains reports that describe the trace input files for this execution of the Block Analysis report utility. The DCB attributes of this output file need not be specified. They are set as LRECL=133, RECFM=FBA, and DSORG=PS.

**DBDRPT**
Report output file. This statement is required only if you specify a DBD= statement in the SYSIN DD. The DBDRPT file contains reports that document the most heavily used blocks for database data sets that you request through statements that are supplied in the SYSIN DD. The DCB attributes of this output file need not be specified. They are set as LRECL=133, RECFM=FBA, and DSORG=PS.

**SPLRPT**
Report output file. If this DD statement is omitted, the subpool reports are not produced. The SPLRPT file contains reports that document the most heavily used blocks for each subpool used by the IMS subsystem or batch job. The DCB attributes of this output file need not be specified. They are set as LRECL=133, RECFM=FBA, and DSORG=PS.

**SYSOUT**
Sort report output file. This DD statement is required for Sort to run successfully. The SYSOUT file is used by DFSort for report and error messages. Your installation might use a different name for its Sort utility report file.

**SYSUDUMP**
Dump diagnostic output file. This DD statement is not required, but its use is recommended. The SYSUDUMP file will contain a diagnostic dump if the block analysis utility ends abnormally.

**BPLTEMP**
Temporary disk file that is used between sort phases. This is a required DD statement. If you encounter an X'37' abend in the sort output file, increase the amount of space that is allocated to this temporary file.

**TRACEexx**
Trace input files. At least one trace DD statement is required. Any DD statement that begins with TRACE is used by the block analysis report as an input file. The trace files must have been created by the IMS Buffer Pool Analyzer BPLTRACE task, and all trace files that are supplied as input to running the Block Analysis report must be from the same IMS subsystem or batch job. Each trace file must be allocated to a different DD name. And, you cannot concatenate trace files to one DD name.

**SYSIN**
Control statement input file. If this DD statement is not included in your JCL, then no Block Analysis reports are generated, but the subpool is generated. The DCB information for this DD statement must be fixed with a record length of 80. The format of the control statement is documented in the next topic.
Block analysis control statements

The Block Analysis report provides several options for user customization. User control statements allow you to specify databases for which Block Analysis reports should be created. All control statements must be specified in the SYSIN DD.

Control statements are specified as KEYWORD=VALUE. Blanks may be included between words in the statement. Continued statements are not permitted, but multiple statements are allowed.

The following statement is supported:

**DBD**
This statement allows you to specify the names of databases for which Block Analysis reports will be created. You can specify a database name or ALL to request that all databases be reported.

The following examples show valid block analysis control statements.

```
DBD=DI21PART
DBD=DBFSAMD1
DBD=DBFSAMD2
```

Figure 11. Block analysis control statements

Block analysis report formats

The block analysis utility reads the trace files that you supply and determines each database's block access requests as the access requests are recorded in the trace files. When the block analysis utility runs, it creates the reports that document the input trace files and the reports that document block requests.

Samples of the Block analysis report formats and their descriptions are provided in the following sections.

**SYSPRINT report**

The SYSPRINT output contains a listing of any SYSIN control statements along with any error messages that may have resulted from the control statements or from processing the trace files.

An example of SYSPRINT output is shown next.

```
PAGE 1
DATABASE BLOCK ANALYSIS REPORT

USER SYSIN SPECIFICATIONS;
DBD = ITEMMASG
DBD = PRODCNTG
```

Figure 12. Sample report- SYSPRINT output

**GTF Trace report**

The GTFRPT output file documents the IMS Buffer Pool Analyzer trace files that were supplied as input to the Block analysis report.

**Note:** Any DD name in the report JCL that begins with TRACE is assumed to be a trace file. Also, you cannot concatenate trace files in the JCL. You must use different DD names for each trace file.
An example of the GTF Trace report is shown in the next figure. A separate GTF Trace report is generated for each trace file that is included in the JCL for the Block Analysis report job.

Database block analysis report

The Database block analysis reports are written to the DBDRPT output file. Database block analysis reports are generated only if they are requested using the DBD control statement in the SYSIN DD.

The database reports are produced for each database data set. For each data set, IMS Buffer Pool Analyzer documents data set information. In addition, information about the database data set is documented based on trace information, such as the subpool that was used for the database data set, the hit ratio, the number of buffer requests in the trace, and the number of unique blocks accessed during the trace interval. The report then shows the 200 most frequently accessed blocks in the database data set, including the block number, the number of times that block number was requested, and the number of times the block was found in the buffer pool (the number of hits). Note that the block number, the number of requests, and the number of hits are all shown as hexadecimal numbers.

An example of a Database block analysis report is shown below.
Subpool block analysis report

The Subpool block analysis reports are written to the SPLRPT output file. Subpool block analysis reports are generated for each subpool that was used during the trace interval.

For each subpool, IMS Buffer Pool Analyzer documents subpool information including the subpool type and size, subpool ID, and hit ratio. In addition, the number of subpool requests and the number of unique blocks accessed during the trace interval are shown. The report then shows the 200 most frequently accessed blocks in the subpool, including the DBD name, DCB number or partition ID, the block number, the number of times that block number was requested, and the number of times the block was found in the buffer pool (the number of hits). Note that the block number, the number of requests, and the number of hits are all shown as hexadecimal numbers.

An example of a Subpool block analysis report is shown below.
SUBPOOL BLOCK ANALYSIS

**SUBPOOL INFORMATION:**
- **POOL TYPE**: VSAM
- **BUFFER SIZE**: VSAR
- **COMPONENTS**: DATA AND INDEX
- **SUBPOOL ID**: VDEF
- **HIT RATE**: 100.0%
- **NUMBER OF REQUESTS**: 7,744
- **NUMBER OF UNIQUE BLOCKS**: 28

**MOST FREQUENTLY ACCESSED BLOCKS IN THIS SUBPOOL:**

<table>
<thead>
<tr>
<th>DATABASE</th>
<th>DCB #</th>
<th>BLOCKER</th>
<th>REQUESTS</th>
<th>HITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAINDEXG</td>
<td>1</td>
<td>00000002</td>
<td>000004D9</td>
<td>000004D9</td>
</tr>
<tr>
<td>PAINDEXG</td>
<td>1</td>
<td>00000000</td>
<td>000004D9</td>
<td>000004D9</td>
</tr>
<tr>
<td>PAINDEXH</td>
<td>1</td>
<td>00000002</td>
<td>0000046E</td>
<td>0000046E</td>
</tr>
<tr>
<td>PAINDEXH</td>
<td>1</td>
<td>00000000</td>
<td>0000046E</td>
<td>0000046E</td>
</tr>
<tr>
<td>IMINDEXG</td>
<td>1</td>
<td>00000000</td>
<td>00000200</td>
<td>00000200</td>
</tr>
<tr>
<td>IMINDEXH</td>
<td>1</td>
<td>00000000</td>
<td>000001EA</td>
<td>000001EA</td>
</tr>
<tr>
<td>IAINDEXH</td>
<td>1</td>
<td>00000000</td>
<td>0000011A</td>
<td>0000011A</td>
</tr>
<tr>
<td>IAINDEXG</td>
<td>1</td>
<td>00000000</td>
<td>0000011A</td>
<td>0000011A</td>
</tr>
<tr>
<td>CUIINDEXG</td>
<td>1</td>
<td>00000000</td>
<td>000000DB</td>
<td>000000DB</td>
</tr>
<tr>
<td>CUIINDEXG</td>
<td>1</td>
<td>00000000</td>
<td>000000DB</td>
<td>000000DB</td>
</tr>
<tr>
<td>CUIINDEXH</td>
<td>1</td>
<td>00000000</td>
<td>000000CD</td>
<td>000000CD</td>
</tr>
<tr>
<td>CUIINDEXH</td>
<td>1</td>
<td>00000000</td>
<td>000000CD</td>
<td>000000CD</td>
</tr>
<tr>
<td>PRODCNTH</td>
<td>1</td>
<td>00000002</td>
<td>00000094</td>
<td>00000094</td>
</tr>
<tr>
<td>PRODCNTH</td>
<td>1</td>
<td>00000003</td>
<td>00000022</td>
<td>00000022</td>
</tr>
<tr>
<td>PRODCNTH</td>
<td>1</td>
<td>00000005</td>
<td>0000010F</td>
<td>0000010F</td>
</tr>
<tr>
<td>PRODCNTG</td>
<td>1</td>
<td>00000000</td>
<td>0000001A</td>
<td>0000001A</td>
</tr>
<tr>
<td>PRODCNTG</td>
<td>1</td>
<td>00000003</td>
<td>00000019</td>
<td>00000019</td>
</tr>
<tr>
<td>PRODCNTH</td>
<td>1</td>
<td>00000004</td>
<td>00000018</td>
<td>00000018</td>
</tr>
<tr>
<td>PRODCNTG</td>
<td>1</td>
<td>00000006</td>
<td>00000016</td>
<td>00000016</td>
</tr>
<tr>
<td>PRODCNTG</td>
<td>1</td>
<td>00000001</td>
<td>00000016</td>
<td>00000016</td>
</tr>
</tbody>
</table>

Figure 15. Sample report- Subpool block analysis report
Chapter 5. IMS buffer pool reports

IMS Buffer Pool Analysis provides several reports to help you analyze IMS database buffer pools in order to provide statistical analysis of the impact of changes affecting buffer pools.

The IMS Buffer Pool Analyzer analyzes I/O rates and buffering information for a specific database to facilitate buffer pool changes. These I/O rates and buffering information might be required for changes to a database structure and to develop models to assist you with making informed decisions on the addition of buffers to an existing pool, or sizing requirements for a new buffer pool.

Topics:
- “IMS buffer pool reports overview”
- “Generating the buffer pool reports” on page 30
- “Customizing the buffer pool reports using SYSIN statements” on page 32
- “Buffer pool reports print DD names” on page 35
- “Modeling an alternate buffer pool configuration” on page 36
- “Viewing the IMS Buffer Pool Analyzer reports” on page 37

IMS buffer pool reports overview

The summary reports that are included in the IMS buffer pool report provide recommendations for changes to your database buffer pool environment.

The IMS buffer pool reports include the following information:
- A list of databases that are not using the most efficient buffer size because an eligible subpool is not defined with the most efficient buffer size. For example, the report shows a DBDS with a block size of 2K which is currently using a 4K buffer pool, this leaves 50% of the space in each buffer unused. The report shows the amount of storage that could be saved if a buffer pool with the most efficient size was defined, based on the average number of buffers that are present in the subpool.
- Recommendations for the number of buffers to be allocated to each buffer subpool. These recommendations result from examining each subpool to identify where added storage will provide the greatest reduction in I/O, and where reducing storage results in the least increase in I/O. This technique takes storage from the subpools that use it least efficiently, and gives additional storage to the subpools where the storage provides the most benefit.
- Detailed information regarding each buffer subpool used in your environment. You can use these reports to help you understand the reasons for and the details of the recommendations sets in the summary reports. The reports include the following information:
  - Performance information about the current subpool configuration
  - Projections for subpool performance with different numbers of buffers allocated for the subpool
  - A list of each DBDS that used buffers in the subpool during the data-gathering period
  - Performance information for each DBDS
You can create reports for both the buffer pool configuration that was in use when the data-gathering process was performed, and for an updated buffer pool configuration that you define. Based on reports that you create, you can predict the impact of adding a new buffer subpool and allocating several DBDSs to that subpool. IMS Buffer Pool Analyzer can then examine your new environment and suggest optimal storage allocation for that configuration.

Based on the IMS buffer pool report, you can model a change to your DBDS environment by specifying that one or more data sets has a different block size, CI size, or access method from that which was used at the time that the data was gathered. This is helpful when designing a new buffer pool environment where a major DBDS configuration change will be made.

Include a statement in your report job that specifies the access method, either OSAM or VSAM, and the new block size or CI size to be used for each data set. IMS Buffer Pool Analyzer creates a model environment with changes to your data sets. When the block size or CI size is changed, IMS Buffer Pool Analyzer adjusts the individual buffer requests to model the new block number that is required to fulfill the buffer request.

For example, if the block size of a data set is increased from 1024 to 4096, four times the amount of data will be included in each data set buffer, and IMS Buffer Pool Analyzer will convert each buffer request from a 1K block size to a 4K block size, possibly reducing the number of I/Os that are required for consecutive blocks that are retrieved.

---

**Generating the buffer pool reports**

You can generate a database buffer pool report by running the batch buffer pool report job. Sample JCL, that is shown in the next figure, is included in the SBPLSAMP library in member BPLMAIN.
The following symbolic parameters are defined in the sample job:

**SBPLLINK**

The **SBPLLINK** symbolic parameter sets the data set name of the IMS Buffer Pool Analyzer load library used in the STEPLIB DD.

**TRACE**

The **TRACE** symbolic parameter can be used to set the data set name of one trace data set. Since multiple data sets can be used as input to a report, other trace data sets should be added to the JCL using additional DD names that start with TRACE. Note that trace data sets cannot be concatenated to a single DD name.

**ITKBSRVR**

The **ITKBSRVR** parameter can optionally be used to set the IMS Tools Knowledge Base server name on the LPAR where the report job will run. If IMS Tools Knowledge Base is not used in your installation, or if you do not wish to write the IMS Buffer Pool Analyzer to the knowledge base repository, leave this symbolic parameter blank.

Following are the DD names that are included in the JCL for the Buffer Pool report:

**STEPLIB**

Required DD statement that must refer to a data set that contains the IMS Buffer Pool Analyzer load modules. The library does not require APF authorization for any batch report jobs.

**SYSIN**

Optional DD that you can use to specify reporting options. SYSIN control statements are described next.
SYSPRINT
Print output file for error messages and SYSIN control statements. This is a required DD statement. The DCB information for this DD, that need not be specified, is RECFM=FBA,LRECL=133.

GTFRPT
Print output file for the GTF Trace report. This is an optional DD statement; if this DD statement is not present, the GTF trace report is not produced. DCB information need not be specified, but it is RECFM=FBA,LRECL=133.DSORG=PS.

SPLRPT
Print output file for the Database Buffer Subpool reports. This is an optional DD statement; if this DD statement is not present, the database buffer subpool report is not produced. DCB information need not be specified, but it is RECFM=FBA,LRECL=133.DSORG=PS.

MDLRPT
Print output file for the model subpool reports if an alternate configuration was requested in a DFSVSAMP DD statement or a CHANGE DBD statement in the SYSIN DD. This is an optional DD statement; if this DD statement is not present, the model subpool report is not produced. DCB information need not be specified, but it is RECFM=FBA,LRECL=133.DSORG=PS.

DBDRPT
Print output file for the Database Information report. You can disable this report by specifying the SYSIN statement DBDRPT=NO. This is an optional DD statement; if this DD statement is not present, the database information report is not produced. DCB information need not be specified, but it is RECFM=FBA,LRECL=133.DSORG=PS.

DSNRPT
Print output file for the Data Set Information report. You can disable this report by specifying the SYSIN statement DSNRPT=NO. This is an optional DD statement; if this DD statement is not present, the Data Set Information report is not produced. DCB information need not be specified, but it is RECFM=FBA,LRECL=133.DSORG=PS.

SYSUDUMP
Diagnostic information. If an abend occurs, this information can be useful for troubleshooting the cause.

TRACExxx
Any number of TRACExxx DD names can be included in the report job. The last three characters of the DD name can be any valid characters that are allowed in JCL. Each DD name must have only one GTF trace data set. All data sets are read and combined for reporting purposes. At least one TRACExxx DD statement is required.

DFSVSAMP
Optional DD that you can use to specify an alternate configuration to model. When this DD is specified, this data set must contain IMS buffer pool definition statements as described in the IMS System Definition Guide.

Customizing the buffer pool reports using SYSIN statements

You can include statements in the SYSIN DD of a buffer pool report job that allow you to customize the output that is produced. The SYSIN DD is optional, as are the statements that are documented in this section.
Most SYSIN statements cannot be continued to multiple lines. The exception is the BUFFNO statement that can be continued on as many lines as are necessary. To continue the statement, leave a comma as the last non-blank character on the statement line in one of columns 1–through-72.

The following BUFFNO statements can be specified:

**BUFFNO type (number,number,...)**

The BUFFNO statement allows you to customize the subpool reports that show performance metrics for different numbers of buffers. The BUFFNO statement allows you to replace the default number of buffers with numbers that you choose.

The type= parameter in the BUFFNO statement specifies the type of subpools for which the numbers of buffers will be used. You can specify different numbers of buffers for OSAM, VSAM, VSAM with hiperspace, and DEDB subpools. You can specify the following options in each BUFFNO statement:

- **OSAM**
- **VSAM**
- **HIPERSPACE= (or HS=)**
- **DEDB**

In addition to the type= parameter, you can specify up to 45 different numbers of buffers. Each number can range from 3–to-32768 for OSAM and VSAM, or from 3–to-999999 for Hiperspace™ or DEDB storage formats. The default number of buffers are as follows:

```plaintext
BUFFNO OSAM=(4,8,16,32,64,128,192,256,384,512,768,1024,1536,2048,3072,4096,6144,8192,12288,16384,20480,24576,28672,32768)
BUFFNO VSAM=(4,8,16,32,64,128,192,256,384,512,768,1024,1536,2048,3072,4096,6144,8192,12288,16384,20480,24576,28672,32768)
BUFFNO HIPERSPACE=(4,8,16,32,64,128,192,256,384,512,768,1024,1536,2048,3072,4096,6144,8192,12288,16384,20480,24576,28672,32768,40960,49152,57344,65535,81920,98304,131072,163840,196608,262144)
BUFFNO DEDB=(4,8,16,32,64,128,192,256,384,512,768,1024,1536,2048,3072,4096,6144,8192,12288,16384,20480,24576,28672,32768)
```

IMS Buffer Pool Analyzer automatically adds entries for the actual number of buffers in the subpool, and if DFSVSAMP input is included, the number of buffers that are specified for that subpool.

You can specify all four types of BUFFNO statements in the SYSIN DD, or specify only those types that you choose. For example, you could include only OSAM= and VSAM= statements and allow hiperspace and DEDB values to default to the values that are shown above.

BUFFNO statements are the only SYSIN statements that can be continued. Only columns 1 through 72 are treated as data. To continue a BUFFNO statement, ensure that the last non-blank characters within columns 1-through-72 is a comma. A complete BUFFNO statement is identified by a closed parenthesis.

**Tip:**

- IMS Buffer Pool Analyzer uses only the values that you specify when it evaluates whether increasing or decreasing the number of buffers makes a subpool more or less efficient. The accuracy of the
summary subpool reports depends on whether there are enough valid entries and sizes, and whether they span a sufficiently large number of subpools.

- The largest number for each type determines the number of buffer slots that are tracked during processing of the Buffer pool report job. Having a very large number can significantly increase the job's processing time.

The following samples show valid BUFNO statement examples:

```plaintext
//SYSIN DD *
BUFNO OSAM=(3,32,100,200,300,400,500,600,700,800,900,1000,2000, 3000,4000,5000,6000,7000,8000,9000,10000,20000, 30000)
BUFNO VSAM=(500,400,300,200,100,4,600,700,800,900,1000,2000, 3000,4000,5000,6000,7000,8000,9000,10000,20000, 30000)
BUFNO DEDB=(5, 100, 200, 300,400,500,600,700,800,900,1000, 2000,3000,4000,5000,6000,7000,8000,9000,10000, 10000,20000,30000,40000,50000, 30000)
```

**CHANGE DBD statements**

The following two CHANGE statements can be used:

```plaintext
CHANGE DBD=(dbdname,dsid),AM=OSAM,BLKSIZE=size
CHANGE DBD=(dbdname,dsid),AM=VSAM,DATACISIZE=size,INDEXCISIZE=size
```

The CHANGE statements allow you to model the impact of changing the access method, and block size or CI size of a DBDS. When a CHANGE statement is included in the SYSIN statements, IMS Buffer Pool Analyzer produces both a subpool report (in the SPLRPT DD) and a model subpool report in the MDLRPT DD. The SPLRPT subpool report reflects the actual DBDS characteristics. The MDLRPT DD subpool report reflects the impact of changing the DBDS access method, block size, or CI size.

The CHANGE statement keywords are as follows:

- **DBD** This keyword specifies the database name and, optionally, the data set number, or HALDB partition ID. For example, DBD=DI21PART will cause all data sets that are associated with the DI21PART database to be changed. Specifying DBD=(DI21PART,1) will cause only the first data set to be changed.

- **AM** This keyword specifies the access method for the new database data sets. You can specify either VSAM or OSAM.

- **BLKSIZE**
  - This keyword is required for AM=OSAM and is invalid for AM=VSAM. It specifies the new block size that the specified data sets will have in the model reports MDLRPT DD.

- **DATACISIZE**
  - This keyword is required for AM=VSAM and is invalid for AM=OSAM. It specifies the new data CI size that the specified data sets will have in the model reports MDLRPT DD.

- **INDEXCISIZE**
  - This keyword is optional for AM=VSAM and is invalid for AM=OSAM. It specifies the new index CI size that the specified data sets will have in the model reports MDLRPT DD.
**DBDRPT**=YES | NO
The **DBDRPT** statement allows you to include or exclude the creation of the Buffer pool database report. Include the creation of the Buffer pool database report in the **DBDRPT** statement by specifying YES. Or exclude the creation of the Buffer pool database report in the **DBDRPT** statement by specifying NO. The default is **DBDRPT**=YES. If you specify **DBDRPT**=NO, the DBDRPT DD statement in the Buffer pool report JCL is not required.

**DSNRPT**=YES | NO
The **DSNRPT** statement allows you to include or exclude the creation of the Buffer pool data set report. Include the creation of the Buffer pool data set report in the **DSNRPT** statement by specifying YES. Or exclude the creation of the Buffer pool data set report by specifying NO. The default is **DSNRPT**=YES. If you specify **DSNRPT**=NO, the DSNRPT DD statement in the Buffer pool report JCL is not required.

**VARYPCT** (***nnn***%)
The **VARYPCT** statement allows you to specify the criteria for choosing subpools that contain databases with different I/O hit ratios. The default **VARYPCT** statement is 80%. The higher the value specified, the more likely that a subpool will be reported in the varied I/O hit ratio report.

**VARYPCT**=70% indicates that seventy percent of the buffer requests for a particular subpool must have been for databases that have I/O hit ratios in a twenty percent range.

---

**Buffer pool reports print DD names**
IMS Buffer Pool Analyzer's Buffer pool report produces a multitude of reports, each of which is written to a different print DD.

The following DD names are used for buffer pool report output. The description of each DD name is presented in the following list.

**SYSPRINT**
The SYSPRINT DD includes diagnostic messages that describe any error conditions that were encountered during processing, along with a list of the statements that were supplied in the SYSIN DD to control the options that were used to generate the report.

**GTFRPT**
The GTFRPT DD includes the GTF trace report that describes the GTF trace data sets that are supplied as input to this buffer pool report.

**SPLRPT**
The SPLRPT DD contains the database buffer subpool reports. These reports document the current IMS buffer pool environment. If a DFSVSAMP DD was used to specify an alternate environment, the MDLRPT DD will contain reports documenting the alternate environment. The database subpool reports include summary subpool information, recommendations for improving buffer pool performance, and detailed information about each subpool in the configuration.
MDLRPT

The MDLRPT DD contains database subpool reports for the alternate configuration that was requested in the DFSVSAMP DD. The database subpool reports include summary subpool information, recommendations for improving buffer pool performance, and detailed information about each subpool in the configuration.

DBDRPT

The DBDRPT DD contains the database report. This optional report can be suppressed by including DBDRPT=NO in the SYSIN statements. When it is produced, the database report provides information about the databases that were used by IMS during the trace intervals. This includes some statistical information such as hit ratio and activity rates.

Note: This information is also provided in the subpool reports; each subpool detailed report includes a list of all the databases that were used in that subpool.

DSNRPT

The DSNRPT DD contains the data set reports for OSAM and VSAM data sets. These reports provide a listing of the databases that were used during the trace interval, their DD names and data set names. This optional report can be suppressed by including DSNRPT=NO in the SYSIN.

Modeling an alternate buffer pool configuration

IMS Buffer Pool Analyzer allows you to make buffer pool configuration alterations and to produce the subpool reports that are based on these alternate configurations.

You can add, remove, or change subpool definitions, change the association of DBDSs with subpools, and change the block or CI size of a data set.

Changing the access method or block size of a database

IMS Buffer Pool Analyzer allows you to model the impact of a change to the access method, either OSAM or VSAM, and the block size or CI size of a DBDS. If you plan to make a database change, IMS Buffer Pool Analyzer allows you to review the impact of the change on your buffer pool configuration and to plan changes to your configuration before the actual database change is implemented.

To model the impact of a database change, supply one or more CHANGE DBD statements in the SYSIN DD of the BPLMAIN report job. IMS Buffer Pool Analyzer will produce reports for the trace data that was supplied that documents the performance of the old database configuration in the SPLRPT DD and the performance of the new database configuration in the MDLRPT DD. This allows you to compare buffer pool performance before and after the change, and also to review suggestions for changes to your buffer pool configuration that would affect changes you choose to make in your database configuration.

You can also make changes to your buffer pool configuration, as described in the next section, which IMS Buffer Pool Analyzer combines with changes to your database configuration to produce the model subpool reports.
Changing the IMS buffer pool configuration

IMS Buffer Pool Analyzer also allows you to specify a new buffer pool configuration that will be used along with existing trace data to determine the impact of a buffer pool configuration change. Specify an updated buffer pool configuration by adding a DFSVSAMP DD statement to the BPLMAIN report JCL, and specify IMS buffer pool definition statements using this DD name. IMS Buffer Pool Analyzer supports all of the valid control statements that can be specified in DFSVSMxx as described in the *IMS Installation Guide, Volume 2*. Statements that are unrelated to buffer pool definitions and database assignments to buffer pools are ignored. Ignoring those statements and assignments allows you to copy all existing statements from your current DFSVSAMP definitions for the IMS control region or batch job, make changes to the buffer pool definitions, validate performance using the buffer pool report job, and copy the updated DFSVSAMP control statements back for use by the IMS control region or batch job.

Alternate configuration reports

IMS Buffer Pool Analyzer produces a second set of subpool statistics reports for the new configuration. All reports that are written to the SPLRPT DD for the configuration that was in place when the trace was taken, are produced for the alternate configuration and are written to the MDLRPT DD. In addition to the subpool statistics reports, IMS Buffer Pool Analyzer also lists the DFSVSAMP statements that were used to create the model configuration. The DFSVSAMP information is listed before the subpool statistics reports in the MDLRPT. An example of the DFSVSAMP statement information is shown in the following figure.

Figure 17. User DFSVSAMP model subpool specification information

Following this report, all of the subpool statistics reports are written to the MDLRPT DD. This report listing includes the subpool summary, all of the IMS Buffer Pool Analyzer recommendation reports, and subpool detail reports. All of these reports reflect the changes in the configuration, including any CHANGE DBD statements along with updates to the IMS buffer pool definitions.

Viewing the IMS Buffer Pool Analyzer reports

IMS Buffer Pool Analyzer produces several reports. The reports are written to several SYSOUT files that can also be archived and viewed using IMS Tools Knowledge Base, if it is installed and available at your installation.

When accessing IMS Buffer Pool Analyzer reports through IMS Tools Knowledge Base, you will select a report job and be presented with a selection menu for the reports that are available for that report job. The reports will be named the same as...
the DD names that are documented in the preceding section. Some report jobs might have fewer reports, because there might not be any model reports, or the DBD or DSN reports could have been disabled with control cards.

The GTF trace report shows time stamps and the number of records for each GTF trace data set that is included in the report job.

The following example shows a GTF trace report that includes two input GTF trace data sets. For each trace data set, the start and end times of the trace data and the elapsed time of each trace are shown. The number of records of each type are also shown, including breakdowns for OSAM, VSAM, and DEDB record, by type, of GTF trace record.

In addition, the GTF trace report provides information on lost records and lost blocks. Lost records occur when GTF buffers fill, and no buffer space is available for additional trace records. Lost blocks typically occur during write errors to the trace data set or during periods of very high trace activity. After trace buffers become available, GTF writes an error record that provides information on the number of trace records that were discarded for lack of buffer space. The report shows both the number of GTF error records and the total number of trace records that were discarded.
The reference information that is provided in the GTF trace report includes the following fields:

**CONTROL**
A GTF record type that shows the number of control records that were produced by GTF that are not used by IMS Buffer Pool Analyzer.

**BFR POOL ANAL**
These are records generated by IMS Buffer Pool Analyzer. Records might include information on subpool definitions, DBDS information, control records, or DEDB lookaside buffer statistics.

**OSAM / VSAM**
These types of records are OSAM trace records that are produced by IMS or VSAM trace records that are produced by VSAM. When appropriate, OSAM and VSAM GTF trace record subtypes are listed.

**UNKNOWN TYPE**
GTF trace records with an event ID that does not match any record types that IMS Buffer Pool Analyzer processes (440 - Buffer Pool Analyzer records, F4F - IMS OSAM records, and F61 - VSAM records). There should be no records in this category. If the report indicates the presence of records, investigate the event ID that is associated with the records, determine the source of the record type, and disable recording the records. For assistance, contact the IBM Software Service center.

---

**Figure 19. GTF trace report**

The reference information that is provided in the GTF trace report includes the following fields:

**CONTROL**
A GTF record type that shows the number of control records that were produced by GTF that are not used by IMS Buffer Pool Analyzer.

**BFR POOL ANAL**
These are records generated by IMS Buffer Pool Analyzer. Records might include information on subpool definitions, DBDS information, control records, or DEDB lookaside buffer statistics.

**OSAM / VSAM**
These types of records are OSAM trace records that are produced by IMS or VSAM trace records that are produced by VSAM. When appropriate, OSAM and VSAM GTF trace record subtypes are listed.

**UNKNOWN TYPE**
GTF trace records with an event ID that does not match any record types that IMS Buffer Pool Analyzer processes (440 - Buffer Pool Analyzer records, F4F - IMS OSAM records, and F61 - VSAM records). There should be no records in this category. If the report indicates the presence of records, investigate the event ID that is associated with the records, determine the source of the record type, and disable recording the records. For assistance, contact the IBM Software Service center.
LOST RECORDS
GTF logs the number of records that were discarded because of insufficient buffer space. The number of records shows how many occurrences of lost records were recorded. When present, the actual number of records that were discarded is also listed.

LOST BLOCKS
GTF logs the number of blocks that were discarded because of insufficient buffer space. The number of records shows how many occurrences of lost blocks were recorded. When present, the actual number of blocks that were discarded is also listed.

Reducing GTF lost records
If you notice a significant number of lost GTF trace records or blocks in report job GTF Trace reports, you can make changes to the BPLGTF PROC that can help to reduce or eliminate the lost information.

Increasing the BLOK, NCP, and SIZE parameters can help because doing so increases the amount of space that is available to GTF for records before they are written to the trace data set. Remember that the BLOK= PROC symbolic value specifies the amount of ECSA that GTF will use for GTF record storage. Use care when increasing this value because shortages of ECSA can cause significant problems for z/OS.

The SIZE= symbolic value specifies the amount of private storage in the BPLGTF address space that will be used for output buffers. Increasing this value will not impact other jobs that are running on the system. You can also increase the NCP= symbolic value, which will allow more concurrent I/O requests for the trace data set.

If your trace data set is allocated to DASD, try moving it to tape. While tape can be a slower medium, buffering capabilities in new hardware and chained writes that are issued by GTF can actually improve the performance of the trace data set, especially if the data set is allocated on an active volume.

Data set information reports
The Data set information report shows which data sets are associated with the performance reports.

There are two reports: one for OSAM DBDSs and one for VSAM DBDS components.

Data set information reports are optional. These reports can be suppressed by supplying a statement in the SYSIN DD with DSNRPT=no.

Data set information reports provide information about data set names that could be referenced by the batch job or subsystem. Only data sets that could be used by the job are presented:
- For batch jobs, this includes every DBD in the PSB that has a database data set that is either present in the job’s JCL or available for dynamic allocation by DFSMDA members or from information in the RECON data sets for Fast Path and HALDB databases.
- For online systems, the list includes data set names for every DBDS that has a valid ACBLIB member; including data set names that are available from the JCL or DFSMDA members or those that are available from RECON definitions.
The following data set information report is an example. Information about block or CI size and buffer size is present only for data sets that were active during the trace interval. Note that three types of reports can be generated – one for OSAM data sets, one for VSAM data sets, and one for DEDB DBDSs.

**OSAM Dataset Information**

<table>
<thead>
<tr>
<th>DBDNAME</th>
<th>DCB Type</th>
<th>Buffer Block Size</th>
<th>Buffer Block Size</th>
<th>DDNAME</th>
<th>DSNAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTSDBC</td>
<td>DL/I</td>
<td>8,192 8,192</td>
<td>PARTSDBC</td>
<td>DSFT=DBSC.PARTSDD</td>
<td></td>
</tr>
<tr>
<td>PARTSDBD</td>
<td>DL/I</td>
<td>8,192 8,192</td>
<td>PARTSDBD</td>
<td>DSFT=DBSD.PARTSDD</td>
<td></td>
</tr>
<tr>
<td>PARTSDBE</td>
<td>DL/I</td>
<td>8,192 8,192</td>
<td>PARTSDBE</td>
<td>DSFT=DBSE.PARTSDD</td>
<td></td>
</tr>
<tr>
<td>PDB1001 A</td>
<td>PART CUSTOMRA O08K</td>
<td>8,192 8,192</td>
<td>PDB1001A</td>
<td>BPA1.DBD1.A00001</td>
<td></td>
</tr>
<tr>
<td>PDB1001 B</td>
<td>PART CUSTOMRA</td>
<td>PDB1001B</td>
<td>BPA1.DBD1.B00001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDB1001 C</td>
<td>PART CUSTOMRA</td>
<td>PDB1001C</td>
<td>BPA1.DBD1.C00001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDB1001 D</td>
<td>PART CUSTOMRA</td>
<td>PDB1001D</td>
<td>BPA1.DBD1.D00001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDB1001 E</td>
<td>PART CUSTOMRA</td>
<td>PDB1001E</td>
<td>BPA1.DBD1.E00001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDB1002 A</td>
<td>PART CUSTOMRA O08K</td>
<td>8,192 8,192</td>
<td>PDB1002A</td>
<td>BPA1.DBD1.A00002</td>
<td></td>
</tr>
<tr>
<td>PDB1002 B</td>
<td>PART CUSTOMRA</td>
<td>PDB1002B</td>
<td>BPA1.DBD1.B00002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDB1002 C</td>
<td>PART CUSTOMRA</td>
<td>PDB1002C</td>
<td>BPA1.DBD1.C00002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDB1002 D</td>
<td>PART CUSTOMRA</td>
<td>PDB1002D</td>
<td>BPA1.DBD1.D00002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDB1002 E</td>
<td>PART CUSTOMRA</td>
<td>PDB1002E</td>
<td>BPA1.DBD1.E00002</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**VSAM Dataset Information**

<table>
<thead>
<tr>
<th>DBDNAME</th>
<th>DCB Type</th>
<th>Buffer CI Size</th>
<th>Buffer CI Size</th>
<th>DDNAME</th>
<th>DSNAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDB1046 X</td>
<td>INDEX PART CUSTOMRA</td>
<td>4,096 4,096</td>
<td>PDB1046X</td>
<td>BPA1.DBD1.X00046X</td>
<td></td>
</tr>
<tr>
<td>PDB1046 X</td>
<td>DATA PART CUSTOMRA</td>
<td>4,096 4,096</td>
<td>PDB1046X</td>
<td>BPA1.DBD1.X00046D</td>
<td></td>
</tr>
<tr>
<td>PDB1047 L</td>
<td>INDEX PART CUSTOMRA</td>
<td>4,096 4,096</td>
<td>PDB1047L</td>
<td>BPA1.DBD1.L00047X</td>
<td></td>
</tr>
<tr>
<td>PDB1047 L</td>
<td>DATA PART CUSTOMRA</td>
<td>4,096 4,096</td>
<td>PDB1047L</td>
<td>BPA1.DBD1.L00047D</td>
<td></td>
</tr>
</tbody>
</table>

**DEDB Dataset Information**

<table>
<thead>
<tr>
<th>DBDNAME</th>
<th>AREA</th>
<th>Buffer CI Size</th>
<th>Buffer CI Size</th>
<th>DDNAME</th>
<th>DSNAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCTA CCAREA01</td>
<td>VSO</td>
<td>4,096 4,096</td>
<td>CCARDD1P</td>
<td>BPA1.CCARA01P</td>
<td></td>
</tr>
<tr>
<td>ACCTA CCAREA01</td>
<td>VSO</td>
<td>CCARDD1S</td>
<td>BPA1.CCARA01S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACCTA CCAREA02</td>
<td>VSO</td>
<td>4,096 4,096</td>
<td>CCARDD2P</td>
<td>BPA1.CCARA02P</td>
<td></td>
</tr>
<tr>
<td>ACCTA CCAREA02</td>
<td>VSO</td>
<td>CCARDD2S</td>
<td>BPA1.CCARA02S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACCTA CCAREA03</td>
<td>CCARDD3P</td>
<td>BPA1.CCARA03P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACCTA CCAREA03</td>
<td>CCARDD3S</td>
<td>BPA1.CCARA03S</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STOREDBA STOREA01</td>
<td>VSO</td>
<td>512 512</td>
<td>STOREA1P</td>
<td>BPA1.STORA01P</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 20. Sample report - Data set information*

The reference information that is provided in the OSAM and VSAM data set information reports includes the following fields:

**DBDNAME**

The database name.

**AREA**

The DEDB AREA name.
**DCB NUM**
The DCB number within the database for this data set, or the HALDB partition ID.

**VSAM COMP**
This information is present only in the VSAM data set information report, this field shows the VSAM data set component. It can be either DATA or INDEX.

**DB TYPE**
This field indicates the type of database, either: DL/I full function database, PART that is a partition of a HALDB, or DEDB that is a Fast Path data entry database.

**MASTER HALDB**
This field is blank unless the database is a HALDB partition. For partitioned databases, this field shows the master HALDB database name of which this partition is a member.

**VSO**
The VSO field is shown only in the DEDB section of the report. The VSO column indicates whether the area is using the DEDB Virtual Storage Option (VSO) or not. The VSO column entries are as follows: If VSO is shown in the VSO column, the area is using VSO. If there are blanks in the VSO column, the area is not using VSO.

**LOOK ASID**
The Looksaside column is shown only in the DEDB section of the report. This column indicates whether the area is using the DEDB Looksaside option for database buffering. The LOOK ASID column entries are as follows: If LKAS is shown in the LOOK ASID column, the area is using the Looksaside option. If there are blanks in the LOOK ASID column, the area is not using the Looksaside option.

**SUBPOOL**
The subpool indicates the name of the subpool that was used by this DBDS during the trace interval. If the database was modified in the DFSVSAMP statements to use a different subpool, the new subpool name is not indicated in this report.

**BUFFER SIZE**
The BUFFER SIZE shows the size of the buffers that were used by this database during the trace interval. This does not reflect changes to the assigned buffer pool that might have occurred because of a CHANGE DBD command or changes in the buffer pool sizes that were made in DFSVSAMP statements. Also, if the DBDS was not used during the trace interval, this field will be blank.

**BLOCK SIZE / CI SIZE**
This field shows the size data set block size for OSAM or the CI size for VSAM. This does not reflect updates to the database that were specified in a CHANGE statement that was included in the SYSIN statements.

**DDNAME**
This field shows the DD name that was used by this DBDS.

**DSNAME**
This field shows the data set name of the DBDS. For VSAM data sets, this is the data set name of the data or index component.
Database statistics reports

Database statistics reports are listed by database access method, either OSAM or VSAM. The report lists detailed information about the DBDS along with I/O activity rates and hit ratios by DBD name and DCB number.

Database statistics reports are optional. You can suppress them by supplying a statement in the SYSIN DD specifying `DBDRPT=NO`.

Database statistics reports show actual numbers that are based on the GTF data that was processed.

The following figure shows an example of portions of the OSAM, VSAM, and DEDB database statistics reports.

![Table of OSAM database statistics](image)

![Table of VSAM database statistics](image)

![Table of DEDB database statistics](image)

**Figure 21. Sample report- Database statistics**

The reference information that is provided in the OSAM and VSAM database information reports includes the following fields:
DBDNAME
  The database name.

AREA
  The DEDB AREA name.

DCB NUM
  The DCB number within the database for this data set or the HALDB partition ID.

VSAM COMP
  Present only in the VSAM data set information report, this field shows the VSAM data set component. It can be either DATA or INDEX.

MASTER HALDB
  This field is blank unless the database is a HALDB partition. For partitioned databases, this field shows the master HALDB database name of which this partition is a member.

SUBPOOL
  Indicates the name of the subpool that was used by this DBDS during the trace interval. If the database was modified to use a different subpool in the DFSVSAMP statements, the new subpool name is not indicated in this report.

BUFFER SIZE
  The size of the buffers that were used by this database during the trace interval. This does not reflect changes to the assigned buffer pool that might have occurred because of a CHANGE DBD command or changes in the buffer pool sizes that were made in DFSVSAMP statements. Also, if the DBDS was not used during the trace interval, this field will be blank.

BLOCK SIZE/CI SIZE
  The data set block size for OSAM, or CI size for VSAM. This does not reflect updates to the database that were specified in a CHANGE statement that was included in the SYSIN statements.

HIT RATIO
  Shows the percentage of buffer requests that were satisfied from buffers in the subpool.

REQUESTS PER SECOND
  Shows the average number of database buffer requests per second that were made during the trace interval.

READS PER SECOND
  Shows the average number of database I/Os per second that were required to fulfill buffer requests during the trace interval.

Subpool statistics reports

IMS Buffer Pool Analyzer can produce either one or two sets of subpool statistics. The first set is written to DD name SPLRPT. The second set is written only if you requested a change to the subpool configuration.

The reports that are written to SPLRPT document the IMS buffer pool configuration that was in place at the time that trace data was gathered. The second set of subpool statistics are written if you requested a change to the subpool configuration through the DFSVSAMP DD statement, or a change to database access method or block size through a CHANGE statement in the SYSIN
DD. The same reports are produced for both the actual configuration that is written to the SPLRPT DD and the model configuration that is written to the MDLRPT DD.

There are several types of reports that can be created, all of which are described in the following sections. Some of the reports, such as the Inefficient buffer size report and the Varied hit ratio report, are exception reports. These exception reports will not appear in the output if no exceptions were encountered.

**Subpool summary**

The first report in the Subpool Statistics reports is the subpool summary. It shows a summary of all of the defined subpools.

The next figure shows an example Subpool summary report with some lines removed.

<table>
<thead>
<tr>
<th>DATABASE SUBPOOL SUMMARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>OSAM</td>
</tr>
<tr>
<td>OSAM</td>
</tr>
<tr>
<td>OSAM</td>
</tr>
<tr>
<td>OSAM</td>
</tr>
<tr>
<td>OSAM</td>
</tr>
<tr>
<td>VSAM-I</td>
</tr>
<tr>
<td>VSAM-D</td>
</tr>
<tr>
<td>VSAM-I</td>
</tr>
<tr>
<td>VSAM-D</td>
</tr>
<tr>
<td>VSAM-I</td>
</tr>
<tr>
<td>VSAM-D</td>
</tr>
<tr>
<td>VSAM-D</td>
</tr>
<tr>
<td>VSAM-I</td>
</tr>
<tr>
<td>VSAM-D</td>
</tr>
<tr>
<td>VSAM-D</td>
</tr>
<tr>
<td>VSAM</td>
</tr>
<tr>
<td>*GRAND TOTAL</td>
</tr>
</tbody>
</table>

*Figure 22. Sample report- Database subpool summary*

The Subpool summary report documents the buffer pool environment. The columns of the summary report show the configuration: subpool type, size, name, and number of buffers, and performance information for each subpool. The report also provides subtotals by access method and grand totals for all access methods.

The Subpool summary report provides a comparison of the extent of buffer pool activity and how hit ratios, buffer life, and marginal reduction compare. You can use this information to make decisions about which subpools are over-allocated, and which subpools could benefit from additional storage. This information can also help you understand why IMS Buffer Pool Analyzer makes certain tuning suggestions.

**Inefficient buffer size report**

The inefficient buffer size report appears only if at least one database that was used during the trace interval does not have buffers of the most efficient size.
This report shows which DBDSs are using buffer sizes that are larger than are required because a smaller buffer size was not available. An example is shown in the next figure.

### THE BUFFER SIZE USED BY THE FOLLOWING DATABASES EXCEEDS THE MOST EFFICIENT SIZE

<table>
<thead>
<tr>
<th>DBDNAME</th>
<th>DCB</th>
<th>TYPE</th>
<th>SUBPOOL</th>
<th>BLKSIZE</th>
<th>USE BSDS CI SIZE</th>
<th>BEST BUFFER SIZE</th>
<th>STORAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH</td>
<td>1</td>
<td>OSAM</td>
<td></td>
<td>8,970</td>
<td>16,384</td>
<td>10,240</td>
<td>768K</td>
</tr>
<tr>
<td>VGGDGMP3</td>
<td>1</td>
<td>VSAM-I</td>
<td></td>
<td>10,240</td>
<td>32,768</td>
<td>12,288</td>
<td>3K</td>
</tr>
<tr>
<td>VGOMAPP1</td>
<td>1</td>
<td>VSAM-I</td>
<td></td>
<td>12,288</td>
<td>32,768</td>
<td>12,288</td>
<td>157K</td>
</tr>
<tr>
<td>*TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>928K</td>
</tr>
</tbody>
</table>

*Figure 23. Sample report- Inefficient buffer size report*

The fields in the Inefficient buffer size report are as follows:

- **DBDNAME**: The database name.
- **DCB**: The DCB number or partition ID for a HALDB database.
- **TYPE**: Database type: OSAM, VSAM-I (VSAM index component), VSAM-D (VSAM data component), or DEDB.
- **SUBPOOL**: The subpool name, if any.
- **CI SIZE OR BLKSIZE**: The actual DBDS CI size or block size.
- **USED BUFFER SIZE**: The buffer size IMS is using for this DBDS.
- **BEST BUFFER SIZE**: The optimal buffer size for the actual CI size or block size.
- **STORAGE**: The average amount of storage that could be saved if a subpool of the "best buffer size" was made available for this DBDS. The amount of storage is calculated based on the difference between the used buffer size and the best buffer size, and the average number of buffers occupied by this DBDS.

If the report is written, consider adding a new buffer subpool that allows the DBDS to use the buffer size that is shown as the best buffer size. In some cases, it might be counterproductive to create a new buffer subpool for an infrequently-accessed data set.

In the preceding report example, the second DBDS, VGGDGMP3, would require a minimum of 3 12K buffers (36K), but the amount of storage that could be saved is only 3K.

**Varied hit ratio report**

The varied hit ratio report appears only if there are varied hit ratio subpools to report.

IMS Buffer Pool Analyzer reviews each DBDS in each subpool. If less than 80% of the buffer requests are within 20% hit ratios, IMS Buffer Pool Analyzer shows the
subpool as having a varied hit ratio. You can adjust the 80% figure using the VARYPCT= statement in the SYSIN DD. The next figure shows an example of a Varied hit ratio report.

<table>
<thead>
<tr>
<th>BUFFER SIZE</th>
<th>TYPE</th>
<th>SUBPOOL</th>
<th>DATABASE</th>
<th>DCB</th>
<th>HALDB MASTER OR AREA</th>
<th>HIT RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.192</td>
<td>OSAM</td>
<td>PCZAMP</td>
<td>A PCZAMP</td>
<td>1</td>
<td>PGZIDP</td>
<td>88.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NIZXCI1</td>
<td>3</td>
<td>PCZAMP</td>
<td>PGIDP</td>
<td>25.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PGZTDA</td>
<td>1</td>
<td></td>
<td>PGZTDA</td>
<td>72.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NIZXCI2</td>
<td>2</td>
<td></td>
<td>PGZTDA</td>
<td>72.2%</td>
</tr>
</tbody>
</table>

Figure 24. Sample report—Varied hit ratio report

The fields in the Varied hit ratio report are as follows:

**BUFFERSIZE**

The subpool buffer size.

**TYPE**  Subpool type: OSAM, VSAM-I (VSAM index component), VSAM-D (VSAM data component), or DEDB.

**SUBPOOL**

The subpool name, if any.

**DATABASE**

The names of the 10 busiest data sets in the subpool. The DBDSs are listed in order of number of buffer requests or the extent to which the DBDS is busy.

**DCB**  The DCB number or partition letter for a HALDB database. This identifies the specific data set in the database.

**HALDB MASTER OR AREA**

For a HALDB partition, the name of the HALDB master database; or, for a DEDB, the area name. For a full-function database, this field is left blank.

**HIT RATIO**

The hit ratio for this DBDS.

This report might show possible conflicts within a buffer pool. In the preceding report example, the busiest DBDS (PCZ7AMF partition A) has a 91% hit ratio. The report was produced because there are two databases in the 10 busiest databases in that subpool that have hit ratios of 25% or less.

Having lower hit ratio databases in the same subpool as much higher hit ratio databases can inhibit the ability to optimally tune your buffer subpool. To tune a subpool effectively, allocate more buffers to very high hit ratio databases and fewer buffers to lower hit ratio databases.

If this report is produced, consider moving either the higher or lower hit ratio databases to a new subpool. You can use the modeling feature of IMS Buffer Pool Analyzer to see the impact of adding a new subpool and assigning some of the DBDSs to the new subpool.
Do this by adding a DFSVSAMP DD statement to the report JCL, and adding the new subpool and DBD statements to your existing DFSVSAMP buffer pool definitions. The MDLRPT DD output will include suggestions about how to allocate buffers to the old and new subpool to maximize the performance of the split subpool.

**Subpool buffer change recommendations report**

IMS Buffer Pool Analyzer examines each buffer subpool to determine the impact of raising or lowering the number of buffers in each subpool.

It produces a report showing changes that could be made to the number of buffers in the traced configuration, and the resulting change in storage used by IMS and the number of database reads per second.

The next figure shows an example of a Subpool buffer change recommendations report with some lines have been removed.

The Subpool buffer change recommendations report shows IMS Buffer Pool Analyzer's recommendations to improve buffer pool performance. For each subpool, the following fields are displayed:

- **BUFFER SIZE**: The subpool buffer size.
- **POOL TYPE**: Subpool type: OSAM, VSAM-I (VSAM index subpool), VSAM-D (VSAM data subpool), or DEDB.
- **SUBPOOL NAME**: The subpool name, if any.
- **CURRENT BUFFERS**: The number of buffers in the pool at the time the trace was run. Or, the number of buffers requested in the DFSVSAMP DD for a model report in the MDLRPT DD.
NEW BUFFERS
IMS Buffer Pool Analyzer’s recommendation for the number of buffers that should be allocated to this subpool.

CHANGE IN STORAGE
The difference between the current amount of storage that is used by the subpool and the amount of storage that the IMS Buffer Pool Analyzer recommends.

CHANGE IN READS/SEC
The difference between the current number of reads-per-second for this subpool and the number of reads-per-second projected for IMS Buffer Pool Analyzer’s recommended number of buffers.

IMS Buffer Pool Analyzer examines each subpool and adds or removes buffers while working to keep approximately the same amount of storage in the total buffer pool. In the example above, IMS Buffer Pool Analyzer was able to reduce the total storage that was allocated to the buffer pool by 7820K. This reduction occurred at the same time that the number of reads were reduced by 58 per second, as shown on the *TOTAL line.

Subpool detail report
IMS Buffer Pool Analyzer provides detailed information about performance for each subpool that is defined.

The subpool detail report includes the following four sections:
• Actual subpool configuration
• Actual subpool performance
• Model of varying buffer pool sizes for actual subpool configuration
• Databases with activity in this subpool

The following figure shows an example subpool detail report:
ACTUAL SUBPOOL CONFIGURATION:
IMSID/JOBNAME: IMS ZICA
BUFFER SIZE: 4,096 VSAM INDEX
BUFFER POOL ID: DFLT
NUMBER BUFFERS: 4,000

ACTUAL SUBPOOL PERFORMANCE:
BUFFER REQUESTS: 2,661,697 8,837.27 PER SECOND
BUFFER POOL HITS: 2,365,445 7,853.66 PER SECOND 88.8%
BUFFER READS: 296,252 983.61 PER SECOND 11.1%
HIT RATIO: 88.8%
BUFFER LIFE: 4.06 SECONDS
MARGINAL REDUCTION: 124

MODEL OF VARYING BUFFER POOL SIZES FOR ACTUAL SUBPOOL CONFIGURATION:

<table>
<thead>
<tr>
<th>NUMBER BUFFERS</th>
<th>POOL SIZE</th>
<th>HIT RATIO</th>
<th>READS PER SECOND</th>
<th>BUFFER LIFE</th>
<th>MARGINAL REDUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>16K</td>
<td>18.2%</td>
<td>7,221.91</td>
<td>0.00</td>
<td>41,512</td>
</tr>
<tr>
<td>100</td>
<td>400K</td>
<td>68.3%</td>
<td>2,793.87</td>
<td>0.03</td>
<td>4,281</td>
</tr>
<tr>
<td>200</td>
<td>800K</td>
<td>73.7%</td>
<td>2,318.18</td>
<td>0.08</td>
<td>1,867</td>
</tr>
<tr>
<td>300</td>
<td>1,200K</td>
<td>76.1%</td>
<td>2,110.66</td>
<td>0.14</td>
<td>1,230</td>
</tr>
<tr>
<td>400</td>
<td>1,600K</td>
<td>77.6%</td>
<td>1,973.95</td>
<td>0.20</td>
<td>922</td>
</tr>
<tr>
<td>500</td>
<td>2,000K</td>
<td>78.8%</td>
<td>1,871.40</td>
<td>0.26</td>
<td>720</td>
</tr>
<tr>
<td>600</td>
<td>2,400K</td>
<td>79.7%</td>
<td>1,791.32</td>
<td>0.33</td>
<td>590</td>
</tr>
<tr>
<td>700</td>
<td>2,800K</td>
<td>80.4%</td>
<td>1,725.76</td>
<td>0.40</td>
<td>502</td>
</tr>
<tr>
<td>800</td>
<td>3,200K</td>
<td>81.1%</td>
<td>1,669.96</td>
<td>0.47</td>
<td>429</td>
</tr>
<tr>
<td>900</td>
<td>3,600K</td>
<td>81.6%</td>
<td>1,622.20</td>
<td>0.55</td>
<td>378</td>
</tr>
<tr>
<td>1,000</td>
<td>4,000K</td>
<td>82.1%</td>
<td>1,580.19</td>
<td>0.63</td>
<td>254</td>
</tr>
<tr>
<td>2,000</td>
<td>8,000K</td>
<td>85.3%</td>
<td>1,297.94</td>
<td>1.54</td>
<td>150</td>
</tr>
<tr>
<td>3,000</td>
<td>12,000K</td>
<td>87.3%</td>
<td>1,122.22</td>
<td>2.67</td>
<td>124</td>
</tr>
<tr>
<td>4,000</td>
<td>16,000K</td>
<td>88.8%</td>
<td>983.57</td>
<td>4.06</td>
<td>0</td>
</tr>
<tr>
<td>5,000</td>
<td>20,000K</td>
<td>88.8%</td>
<td>983.48</td>
<td>5.08</td>
<td>0</td>
</tr>
<tr>
<td>6,000</td>
<td>24,000K</td>
<td>88.8%</td>
<td>983.48</td>
<td>6.10</td>
<td>0</td>
</tr>
<tr>
<td>7,000</td>
<td>28,000K</td>
<td>88.8%</td>
<td>983.48</td>
<td>7.11</td>
<td>0</td>
</tr>
<tr>
<td>8,000</td>
<td>32,000K</td>
<td>88.8%</td>
<td>983.48</td>
<td>8.13</td>
<td>0</td>
</tr>
<tr>
<td>9,000</td>
<td>36,000K</td>
<td>88.8%</td>
<td>983.48</td>
<td>9.15</td>
<td>0</td>
</tr>
<tr>
<td>10,000</td>
<td>40,000K</td>
<td>88.8%</td>
<td>983.48</td>
<td>10.16</td>
<td>0</td>
</tr>
<tr>
<td>20,000</td>
<td>80,000K</td>
<td>88.8%</td>
<td>983.48</td>
<td>20.33</td>
<td>0</td>
</tr>
<tr>
<td>30,000</td>
<td>120,000K</td>
<td>88.8%</td>
<td>983.48</td>
<td>30.50</td>
<td>0</td>
</tr>
<tr>
<td>40,000</td>
<td>160,000K</td>
<td>88.8%</td>
<td>983.48</td>
<td>40.67</td>
<td>0</td>
</tr>
</tbody>
</table>

DATABASES WITH ACTIVITY IN THIS SUBPOOL:

<table>
<thead>
<tr>
<th>DBNAME</th>
<th>DCB</th>
<th>VSAM</th>
<th>HALDB</th>
<th>CI</th>
<th>HIT RATIO</th>
<th>REQUESTS</th>
<th>READS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG15IDF</td>
<td>X</td>
<td>INDEX</td>
<td>PGZIDF</td>
<td>4,096</td>
<td>79.2%</td>
<td>102.28</td>
<td>21.22</td>
</tr>
<tr>
<td>NIZXCI1X</td>
<td>3</td>
<td>INDEX</td>
<td></td>
<td>4,096</td>
<td>69.2%</td>
<td>58.92</td>
<td>18.13</td>
</tr>
<tr>
<td>NIZXCI2X</td>
<td>3</td>
<td>INDEX</td>
<td></td>
<td>4,096</td>
<td>84.6%</td>
<td>84.59</td>
<td>12.94</td>
</tr>
<tr>
<td>NIZXFDRX</td>
<td>1</td>
<td>INDEX</td>
<td></td>
<td>4,096</td>
<td>57.5%</td>
<td>29.99</td>
<td>12.73</td>
</tr>
<tr>
<td>PGZPMTX</td>
<td>1</td>
<td>INDEX</td>
<td></td>
<td>4,096</td>
<td>97.2%</td>
<td>463.02</td>
<td>12.52</td>
</tr>
</tbody>
</table>

Figure 26. Sample report: Subpool detail
The first section of the subpool detail report provides information about the actual subpool configuration. In the preceding example, the actual subpool configuration is displayed, which indicates that this is the IMS configuration that is used during the trace and that is written to the SPLRPT DD data set. The subpool configuration for a model environment that is written to the MDLRPT DD data set would display the following message SUBPOOL CONFIGURATION FROM DFSVSAMP.

The subpool configuration information identifies the IMSID or DL/I batch job name that was traced and the buffer size, buffer pool ID, and number of buffers in the subpool.

The second section of the subpool detail report provides information about the actual subpool performance. The preceding example displays the actual subpool performance that is based on the trace data. If a model configuration is in place, the report message in the MDLRPT DD data set would display DFSVSAMP SUBPOOL CONFIGURATION PERFORMANCE, and the performance metrics would reflect the subpool configuration as it was requested in DFSVSAMP, along with any CHANGE DBD statements that were specified on the SYSIN DD statement.

The performance metrics that are listed in the actual subpool performance section show the number of buffer requests, buffer pool hits, DASD buffer reads, the per-second rates of these metrics, and the percentages of requests that resulted in buffer pool hits, DASD reads, then the hit ratio, buffer life, and marginal reduction value.

The third section of the subpool detail report shows projections for subpool performance metrics for different amounts of storage that are allocated to the subpool, and it displays the resulting performance for different numbers of buffers.
that might be allocated to the subpool. The number of buffers on each line of the report is determined based on the default numbers of buffers for a subpool. Or, you can specify the number of buffers on each line using \texttt{BUFNO} statements in the SYSIN DD statement for the report job.

IMS Buffer Pool Analyzer uses the information in performance projections to review subpool performance and determine whether performance can be improved by increasing or decreasing the number of buffers that are allocated to each subpool.

The fourth section of the subpool detail report lists all of the database data sets that had activity in the subpool, and performance metrics are shown for each data set. The data sets are presented in order of the highest through the lowest number of reads-per-second, which means that the highest I/O data sets are displayed first in each subpool's list of active databases.
Chapter 6. Tuning database buffer pools

Tuning is the process of balancing the distribution of resources to maximize throughput.

Topics:
• “Function and effect of I/O, storage, and CPU resources”
• “Buffer pool and subpool organization” on page 54
• “Buffer pool definitions- DFSVSAMP statements” on page 55
• “Tuning process overview” on page 56

Function and effect of I/O, storage, and CPU resources

When tuning IMS database buffer pools, you should understand the function and effect of three main resources: I/O, storage, and CPU.

Tuning resources helps to increase speed and performance. The descriptions below point out the functions of various resources.

I/O

DASD I/O

DASD I/O is usually the target of reduction, because it is very slow. One thing to consider is that I/O is also a CPU-intensive operation. In CPU-constrained environments, reducing I/O can relieve the CPU resource.

Paging I/O

Paging occurs when MVS determines that there is not enough real storage to meet the needs of all tasks on an LPAR. If increasing IMS buffer storage to reduce DASD I/O causes paging I/O, the net result can be worse performance than would result with increased DASD I/O.

Storage

• Central Storage (pre zSeries/Architecture)
  This is the traditional storage that is present in the mainframe environment. Increasing the number of buffers in a pool increases IMS’s use of central storage space.

• Expanded Storage (pre zSeries/Architecture)
  Expanded storage can be used for VSAM hiperspace buffers or for MVS paging. Excessive use of expanded storage can increase MVS paging I/O, and worsen IMS and system performance.

• 64-bit Storage (zSeries/Architecture)
  In the zSeries/Architecture, expanded storage is combined with central storage. Because the combined total of real storage can exceed 2G, storage above this line is referred to as 64-bit real storage.

CPU
The CPU resource can increase if there are not enough buffers, causing excessive DASD I/O, or if buffer pools are so large that IMS has to search excessively on each buffer request.

Restriction: If your z/Series processor is not running in compatibility mode, and IMS is at version 7.1 (with PQ42127 and postreqs) or higher, 64-bit storage is available only for OSAM database buffers.

Be aware that database I/O avoidance should not be the only consideration when tuning IMS database buffer pools.

It is important to review available real storage before making any changes to the database buffer pools. The RMFMON paging activity report (identified as SPAG on the RMFMON main menu) can provide short-term indications of the number of free frames of central storage (AFC is the number of 4K frames that are available) and expanded storage (ESF AVL is the number of expanded storage frames available).

If you plan to increase the size of any buffer pools, make sure that paging rates will not be adversely affected before implementing the change. Before making such changes, review RMF® data or discuss the situation with your system performance team.

Buffer pool and subpool organization

IMS allows for separating buffer pools by data set, by group of data sets or, for HALDB, by partition.

You can then size OSAM and VSAM buffer pools to reduce the number of database I/Os required to complete a transaction or batch workload.

OSAM buffer pools

OSAM database buffer pools can direct specific DBDSs to specific buffer pools. There is a default buffer pool, typically with several subpools containing different size buffers. For example, the default buffer pool can have one subpool containing 1024-byte buffers, another subpool containing 8,192-byte buffers, and a third subpool containing buffers with 32,768 bytes each.

VSAM buffer pools

VSAM provides for 15 buffer pools, with subpools within each pool. A subpool is a group of buffers of a specific size and component type. VSAM DBDSs can have two types of components: index components and data components. You can have index and data buffers in the same subpool, or you can separate index buffers from data buffers by using two different subpools.

When a DBDS is opened, one specific subpool is assigned for the buffers of that DBDS or possibly, two subpools for a KSDS DBDS, because it contains both a data component and an index component. During a database open, IMS looks at definitions in the DFSVSAMP statements to determine whether this DBDS should be assigned to the default buffer pool or a user-specified buffer pool. Once the buffer pool is identified, the best fit subpool within that buffer pool is assigned for use by the buffers of that DBDS. For a VSAM KSDS, there are two subpools assigned, one for the data component and another for the index component.
One important detail for VSAM data and index pools for a given KSDS with both
data and index components: both the data component and the index component
must reside in the same buffer pool, although they can be in different subpools
within that pool.

Buffer pool definitions- DFSVSAMP statements

Buffer pool specifications are defined in DD statements, that are referred to as
DFSVSAM statements.

IMS buffer pool specifications are defined in statements that are read from the
following sources:
• DFSVSAMP DD for a batch DLI or DBB job
• DFSVSMxxx member of IMS PROCLIB for a DB/DC or DBCTL subsystem where,
  xxx is the VSPEC= value in the DFSPBxxx member of PROCLIB

These statements are referred to as DFSVSAMP statements.

The following example shows how an OSAM buffer pool with three subpools
could be defined. The example defines a 512-byte subpool with 4 buffers, a 2K
subpool with 5 buffers, and a 4K subpool with 12 buffers.

10BF=(512,4,Y,Y)
10BF=(2048,5,Y,Y)
10BF=(4096,12,N,N)

Figure 28. Example of an OSAM buffer pool with three subpools

Additional parameters are required when defining subpools, but for this
discussion, only the buffer pools, subpools, and number of buffers are
documented. All DFSVSAMP statements and parameters are documented in the

IMS defines default OSAM subpools as the first subpool with that buffer size. Any
DBDS can use that subpool if it is not specifically assigned to another subpool
name. If you define two 4K OSAM subpools named SP01 and SP02, all 4K OSAM
DBDSs will use SP01 unless you direct IMS to use SP02, by including a DBD=,
statement in the DFSVSAMP statements.

The two statements in the following example define a pool named SP01 with two
subpools, one with 100 4096-byte buffers and the other with 200 8192-byte buffers.

10BF=(4096,100,N,N,SP01)
10BF=(8192,200,N,N,SP01)

Figure 29. Sample OSAM buffer pool with two subpools

DFSVSAM statements for VSAM pool and subpool definitions are similar. If
multiple VSAM pools are to be defined, a POOLID statement defines the name of
a VSAM pool, and VRBF statements that follow the POOLID define each subpool
within that pool. The example below defines a default subpool named DFLT with
the same subpool configuration as in the preceding OSAM example and a second
pool named SP01 with the same configuration as in the OSAM example.
VSAM subpools have the additional option of specifying that a particular subpool is to be dedicated to either index or data buffers. This option is specified by adding a D for data or an I for index following the number of buffers on the VSRBF= statement. In a given VSAM pool, if any subpool is dedicated to data or index buffers, then all subpools in that pool are also dedicated. If the D or I option is not specified on a VSRBF= statement in such a VSAM pool, then data is assumed.

In the following example, VSAM pool SP02 has 10 1K data buffers, 20 2K index buffers, and 40 4K data buffers. The 4K buffers are data buffers because data is the default when neither data nor index is specified on a subpool definition in a pool that has separate data and index pools.

VSAM allows for 15 buffers pools, each of which can have multiple subpools with different CI sizes or DATA/INDEX types. In a DLI/DBB batch job, subpool 15 is reserved for RECONs, so batch IMS has a limit of 14 buffer pools. Within each VSAM buffer pool, there can be as many as 22 subpools. There are 11 CI sizes (512, 1K, 2K, 4K, and multiples of 4K through 32K), each of which can have a data and an index specification.

In addition, VSAM subpools that are 4K in size or more can have hiperspace buffers. Hiperspace buffers, in a pre zSeries/Architecture environment, provide additional buffers that reside in expanded storage instead of central storage. In central storage-constrained environments, hiperspace buffers can provide additional buffering without consuming additional central storage. Hiperspace buffers are specified on the VSRBF= statement. See IMS Installation Volume 2: System Definition and Tailoring for details on specifying hiperspace buffers.

When creating a new buffer pool, DBDSs must be assigned to the new buffer pool explicitly on the DBD= statement. The statement in the following example assigns data set number 1 of database DI21PART to subpool SP01.

DBD=DI21PART(1,SP01)

Figure 32. Assignment of DBDS to new buffer pool

**Tuning process overview**

During the tuning process, you can review resources, analyze I/O information, balance subpools, and validate the results.
This topic describes the process of tuning buffer pools, which involves the following activities:

1. Reviewing storage resources and paging activity
2. Gathering BPLTRACE database I/O information
3. Reviewing buffer pool sizes
4. Balancing subpools
5. Reviewing subpool buffer allocations
6. Validating the results

**Reviewing storage resources and paging activity**

Before increasing any IMS buffer pool, you should understand not only the implications of real storage and paging activity, but also the implications of virtual storage.

**About this task**

Review real storage and paging rates to ensure that the addition of buffers will not adversely impact either IMS or the other tasks on that MVS LPAR.

Virtual storage should also be a consideration when increasing database buffer pools. All VSAM database buffers are located in 31-bit virtual storage (above the 16M line) except for hiperspace buffers, which are located in a separate data space. When increasing database buffer pool sizes, make sure that sufficient virtual storage is available in the batch job's address space or in the IMS DLI address space. OSAM buffers reside in above the bar (2G line) 64-bit storage on machines with this capability.

Virtual storage usage and limits can be found in the JES messages for the job immediately following the condition code for the job. Look for the IEF374I message, as shown in the following example.

```
IEF374I STEP/G/STOP 2002221.0348 CPU 0MIN 00.56SEC SRB
0MIN 00.10SEC VIRT 852K SYS 304K EXT 1528K SYS 9876K
```

*Figure 33. Message IEF374I regarding virtual storage use and limits*

The virtual storage utilization information is at the end of the message. The example above shows that the job used 852K of private area below the 16M line and 304K of local system queue area (LSQA). It also used 1528K of private area above the 16M line (extended private area) and 9876K of ELSQA (extended LSQA). If you compare the extended private area used with the available extended private area (available either from the REGION= JCL specification or the default extended private area size), you can ensure that increasing the database buffer pool space does not cause problems because of insufficient virtual storage.

**Gathering BPLTRACE database I/O information**

Analysis of trace data is critical to the steps in the tuning process. For an online subsystem, gathering multiple traces at different times helps provide a better sample and ensures that performance is reasonable at all times.

**About this task**

Sample several different workload types if appropriate, for example: prime time workload, nighttime batch workload, and so on. The length of time to perform
trace activity depends on the amount of space in the GTF trace data set, and on the number of buffers in the buffer pools. In order to provide reasonable projections, the number of OSAM and VSAM records that are captured in the traces should be at least five times the total number of buffers in your buffer pools. The more trace data gathered, the more accurate the projections will be.

For a batch job, if the job has consistent database call patterns, several times the number of buffers in the buffer pools should provide reasonable estimates. If the batch job first reads large amounts of data and then does updates, then either one long trace interval or several shorter trace intervals should provide reasonable projections.

**Reviewing buffer sizes**

Review buffer subpool sizes to ensure that subpools with appropriate buffer sizes exist.

**About this task**

For example, if there is a VSAM data set with a 2K CI size but the VSAM buffer pool assigned to that data set only has 1K, 4K, and 8K buffers, then half the storage that is used by buffers of the 2K data set will be wasted because the data set will use the 4K buffers.

IMS Buffer Pool Analyzer will identify any DBDSs that do not have the most efficient buffer size available. If the inefficient buffer size report is not present in the subpool report SPLRPT DD or model report MDLRPT DD, then no databases were identified with inappropriate buffer sizes. If the report is present, you can use the report to identify potential savings from adding new buffer subpools with more efficient buffer sizes. You can then use IMS Buffer Pool Analyzer's modeling feature to define new subpools, and rerun the report to see the impact of the change.

After reviewing the inefficient buffer size report, if you choose to add new subpools, you can use the DFSVSAMP input to allow IMS Buffer Pool Analyzer to determine how many buffers to assign to the old and new subpools. The MDLRPT DD reports will show recommendations for how many buffers to assign to each subpool in your buffer pool configuration.

**Balancing subpools**

When reviewing the existing buffer pool configuration, also review the busiest data sets in each subpool.

**About this task**

A database subpool can be overwhelmed by a large DBDS. A single BMP could easily scan a data set and replace every other database's buffers. Therefore, if the hit ratio for any of the busy data sets is lower than the hit ratio for other data sets in the subpool, consider moving the data set with the lower hit ratio to its own subpool or a subpool that is shared with other data sets with similar activity.

Among the most obvious examples of balancing subpools is separating VSAM data and index buffers into separate subpools. Presumably, VSAM index components will have a very high hit ratio, which means that they should not be in a subpool that is shared with a data set that could replace all the index buffers on a regular basis.
IMS Buffer Pool Analyzer will document any subpools in your configuration that have data sets with varied hit ratios. Review this report to determine whether you could make changes in your subpool configuration that might provide more efficient storage utilization. You can use IMS Buffer Pool Analyzer’s modeling feature to split a subpool and reassign high or low hit ratio databases into different subpools.

If you confirm that there are problems with unbalanced subpools, use the DFSVSAMP input to the buffer analysis job to add new subpools and reassign DBDSs to different subpools. The MDLRPT DD will include recommendations for the number of buffers to allocate to all impacted subpools.

**Reviewing subpool buffer allocations**

Because I/O rates and storage are the primary drivers of a general performance tuning strategy, hit ratios and buffer life should not drive buffer pool allocations, but should be used as an ongoing monitor of performance.

**About this task**

To determine the appropriate number of buffers for each subpool, keep the following points in mind.

**Note:** However, there can be application-specific requirements for performance that override this general tuning strategy.

- The number of buffers for each subpool should be large enough to hold the buffers that are required by any concurrently running applications. This should help you avoid writing buffers to make room for additional reads. Basically, be careful to not make any buffer pool too small.
- Avoid making buffer subpools too large. Wasting storage causes performance degradation of, not only IMS, but of the entire MVS LPAR.
- OSAM sequential buffering can significantly improve some applications.
- OSAM buffer caching in a coupling facility can improve performance but, unless storage in your environment is severely constrained, is not a substitute for a well-tuned buffer pool.

A number of strategies have been used to tune a buffer pool. Buffer pools can be tuned to try to achieve a specific hit ratio in each subpool (for example, 80% for data subpools and 90% for index subpools) or to try to achieve a specific buffer life in each subpool (for example, 30 seconds to 5 minutes in each subpool). These strategies fail to consider that different databases have different access patterns. While it might be possible to tune buffer pools to achieve these objectives, it might be possible to change buffer pool allocations to achieve significantly lower I/O rates using significantly less storage.

The strategy presented here for tuning buffer pool allocations strives to achieve the lowest I/O rate with the least use of storage. IMS Buffer Pool Analyzer now provides a report that uses the following methodology to produce buffer pool recommendations. You can review IMS Buffer Pool Analyzer’s recommendations to determine if they make a sensible alternative configuration in your environment. However, please note that Buffer Analyzer does not make recommendations for the addition or removal of subpools (as described later). Therefore, you should still understand the process that follows, and review whether to add new subpools or consolidate existing subpools.
The Marginal reduction statistics section in the Database subpool statistics report provides a way to compare subpool efficiency as the number of buffers is increased. Each line of the report shows a different number of buffers and information about subpool performance using that number of buffers. The marginal reduction number shows how many I/Os are reduced from the prior line’s buffer number per kilobyte of storage that was added to the pool. This provides a way to identify which subpool would benefit the most from adding more buffers.

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>POOL SIZE (K)</th>
<th>HIT ratio</th>
<th>READS PER SECOND</th>
<th>HITS PER SECOND</th>
<th>BUFFER LIFE</th>
<th>MARGINAL REDUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>16</td>
<td>81.3%</td>
<td>188.6</td>
<td>822.5</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>64</td>
<td>86.4%</td>
<td>117.2</td>
<td>893.9</td>
<td>0.13</td>
<td>3,517</td>
</tr>
<tr>
<td>32</td>
<td>128</td>
<td>91.2%</td>
<td>88.9</td>
<td>922.2</td>
<td>0.35</td>
<td>1,593</td>
</tr>
<tr>
<td>64</td>
<td>256</td>
<td>93.1%</td>
<td>69.0</td>
<td>942.0</td>
<td>0.92</td>
<td>557</td>
</tr>
<tr>
<td>128</td>
<td>512</td>
<td>94.9%</td>
<td>51.1</td>
<td>960.0</td>
<td>2.50</td>
<td>252</td>
</tr>
<tr>
<td>192</td>
<td>768</td>
<td>95.9%</td>
<td>40.5</td>
<td>970.6</td>
<td>4.73</td>
<td>149</td>
</tr>
<tr>
<td>256</td>
<td>1,024</td>
<td>96.7%</td>
<td>33.0</td>
<td>978.1</td>
<td>7.74</td>
<td>104</td>
</tr>
<tr>
<td>384</td>
<td>1,536</td>
<td>97.4%</td>
<td>26.1</td>
<td>985.0</td>
<td>14.69</td>
<td>48</td>
</tr>
<tr>
<td>512</td>
<td>2,048</td>
<td>97.6%</td>
<td>24.0</td>
<td>987.0</td>
<td>21.24</td>
<td>14</td>
</tr>
<tr>
<td>768</td>
<td>3,072</td>
<td>97.6%</td>
<td>23.4</td>
<td>987.7</td>
<td>32.73</td>
<td>2</td>
</tr>
<tr>
<td>1,024</td>
<td>4,096</td>
<td>97.6%</td>
<td>23.4</td>
<td>987.7</td>
<td>43.64</td>
<td>0</td>
</tr>
<tr>
<td>1,536</td>
<td>6,144</td>
<td>97.6%</td>
<td>23.4</td>
<td>987.7</td>
<td>65.46</td>
<td>0</td>
</tr>
<tr>
<td>2,048</td>
<td>8,192</td>
<td>97.6%</td>
<td>23.4</td>
<td>987.7</td>
<td>87.28</td>
<td>0</td>
</tr>
</tbody>
</table>

Figure 34. Sample report- Marginal reduction statistics

The process of determining how many buffers should be allocated requires that you perform the following tasks:

1. Determine, for each subpool, the marginal reduction number that applies to the subpool’s current number of buffers. If the current number of buffers in the pool is not listed, estimate the number by using the marginal reduction number from the two closest lines. In the marginal reduction statistics example, if the current number of buffers in the subpool is 64, the marginal reduction number would be 557. If the number of buffers defined is 100, you could estimate the marginal reduction number as 400 (approximately the average of 557 and 252, the marginal reduction numbers for 64 and 128 buffers, respectively).

2. For any subpools with a marginal reduction of 0, find the lowest number of buffers in that subpool that has a marginal reduction of 0. Note this number of buffers as the new recommended number of buffers. In the marginal reduction statistics example, if the number of buffers currently defined in the subpool is 2048, then 1024 buffers is the least number of buffers with a marginal reduction number of 0. Because these are 4096-byte buffers, note that 4M of storage is freed for use in increasing other subpools.

   a. If there are fewer buffers remaining in the pool than the number of dependent regions or the PST= parameter in DFSPBxxx, use the number of dependent regions for the number of buffers.

   b. If the number of buffers in the pool is less than 10, consider merging this subpool into the next larger subpool. If either this pool or the next larger pool is very busy (either in I/O rate or request rate), leave the subpool as it is. For subpools with a small number of buffers, consider adding buffers to allow for growth. For example, if an index has a CI split and is the only data set in a buffer pool that is tuned exactly to the number of index CIs, the CI split will cause a very large number of I/Os to occur.
3. Compare the marginal reduction numbers for each subpool. Those with a large marginal reduction number benefit the most from the addition of buffers. Those subpools with low marginal reduction numbers can have the number of buffers reduced with the least impact. Adjust the number of buffers in each subpool to make the marginal reduction for each subpool closer. Depending on whether additional real storage is available, it might be necessary to reduce the size of some subpools in order to increase the size of other subpools.

Validating the tuning results

To ensure that you have achieved the tuning results that you were seeking, you can validate the results using the process that is described in this section.

About this task

To validate results of your tuning efforts, follow the steps below:

Procedure

1. Run the IMS Buffer Pool Analyzer reports using the number of buffers you determined with the preceding reviewing subpool buffer allocations process.
2. Compare the total buffer pool size in the original configuration with the total buffer pool size in the new configuration.
   Because this is the amount of storage that will be added to the virtual storage that is used by the address space, ensure that the job or started task has enough virtual storage to accommodate the addition. Also, ensure that the additional use of real storage will not adversely impact MVS performance and paging.
3. Verify that the total I/O rates for the new configuration are lower than those for the original configuration.
4. Run additional trace sessions to validate the new configuration.
   If you take several traces at different times, run all the traces into a single report, along with running the traces individually. Ensure that the changes to improve the average workload do not adversely impact any particular workload, such as nighttime BMP work or other work.

Implementing the updated buffer specifications

About this task

To implement buffer pool specifications, bring the IMS subsystem down and then back up. Ensure that any changes that you make to affect one IMS or batch job are not unintentionally implemented in other jobs.
Chapter 7. Coupling facility IMS OSAM cache reports

In addition to database buffer pools, IMS provides the option of using storage in a coupling facility to cache OSAM database blocks.

Topics:
- “Coupling facility IMS OSAM cache overview”
- “Implementing the IMS OSAM cache”
- “Using IMS Buffer Pool Analyzer for an IMS OSAM cache” on page 66
- “BPLCF coupling facility report” on page 67
- “Coupling facility report print DD names” on page 72
- “GTF trace report” on page 73
- “OSAM data set information reports” on page 75
- “Coupling facility cache reports” on page 76
- “Modeling an alternate configuration” on page 84

Coupling facility IMS OSAM cache overview

You can efficiently store your database blocks using the IMS OSAM caching method.

The IMS OSAM cache was designed for use in a data sharing environment, and the IMS OSAM cache works most efficiently for small databases that are updated frequently. The IMS OSAM cache is not a substitute for the typical database buffer pools that are allocated in storage of the IMS subsystem.

Coupling facility IMS OSAM caching requires that IMS resource lock manager (IRLM) is used for block-level database sharing, and that a structure is allocated in a coupling facility to cache OSAM blocks.

Although retrieving a database block from the cache in a coupling facility structure is not nearly as efficient as obtaining a block from the database buffer pool, this approach is typically more efficient than reading the block from DASD.

Important: Using the IMS OSAM cache results in some additional overhead, however. The database blocks must be written to the coupling facility structure so that they can be retrieved later. This process introduces additional I/O activity to keep the coupling facility structure up-to-date and populated with the most current blocks.

Implementing the IMS OSAM cache

You need to set up the IMS OSAM cache structure size and configure IMS for an n-way block-level sharing environment.

About this task

To implement the IMS OSAM cache structure size, perform the following steps:
Procedure
1. Ensure that the IRLM lock table structure is used as your IMS Resource Lock Manager.
2. Ensure that the PROCLIB member, DFSVSMxx includes the following structures and ratios:
   - A CFNAMES statement that specifies names for the IRLM lock table structure
   - The VSAM cross invalidation (XI) structure
   - The OSAM cache structure
   - The CFNAMES statement must specify a directory ratio
   - The CFNAMES statement must specify an element ratio for the OSAM cache structure
3. Update at least one coupling facility to define the structures that are named in the CFNAMES statement.
   You update your coupling facilities by updating the coupling facility resource management (CFRM) policy. The CFRM policy specifies the names and sizes of the structures that are included in the coupling facilities.
   For more information about the process and statements that are associated with coupling facility structure definitions, see z/OS MVS Setting Up a Sysplex, SA22-7625.
4. When you have updated your IMS configuration and coupling facility to enable IMS OSAM caching, determine and note the following three pieces of information:
   - Which subpools should be cached
   - How large the OSAM cache structure should be
   - What the directory ratio and element ratio should be

IMS OSAM cache structure storage sizing
The structure of the IMS OSAM cache storage is divided into three parts: directory space, element space, and structure overhead.

Directory space
Directory space storage is used to track information about specific database blocks, including which subsystems have each block in a local buffer pool and whether the block was updated. Each directory entry takes 200 - 350 bytes of structure storage, depending on the level of software that is running in the coupling facility. You must have created directory entries, for all blocks that are cached in the structure, and also for a directory entry for each OSAM buffer in each IMS subsystem (DL/I batch or control region) that is active in the data sharing environment.

Element space
Element space is storage that is used for database blocks. For an IMS cache, each element is 2048 bytes. Each database block in the cache will occupy from 1 - 16 elements because the maximum OSAM block size is 32 KB.

Structure overhead
Structure overhead storage is a fixed amount of storage that is required by the coupling facility software to manage the structure. The size of the overhead varies depending on the level of software that is in the coupling facility. Structure overhead can range from under 100 KB to nearly 4 MB.
IBM provides a Web-based tool called the CF Sizer tool that can assist you in
determining the structure size that is required for an IMS OSAM cache structure
for a specified number of buffers, blocks to cache, and average block size. The CF
Sizer tool provides storage estimates that are based on the most current software
level for a coupling facility. You can access this CF Sizer tool at:

**Specifying directory and element ratios**

Specify the amounts of storage for each of the three parts of the IMS OSAM cache
structure: directory space, element space, and structure overhead.

**About this task**

Specify the amount of storage to allocate to directory space and the amount of
storage to allocate to element space by performing the following steps:

**Procedure**

1. Specify the amount of storage to allocate to directory space and the amount of
   storage to allocate to element space by specifying a directory ratio and an
element ratio.
   The coupling facility software uses these ratios to determine how many bytes
   are allocated to directory space and element space.
2. Specify the directory ratio and element ratio in the CFNAMES statement in the
   IMS PROCLIB member DFSVSMxx.
   Specify each ratio as an integer from 1 - 999. For example, if you specify a
directory ratio of 1 and an element ratio of 4, four elements are allocated in the
structure for each directory entry.
   These settings are ideal if you have only 8 KB OSAM buffers and all buffers are
   cached because each 8 KB OSAM buffer requires four 2 KB elements.
3. In your environment, you will probably not cache every buffer pool. You might
   have more than one buffer size that you are caching. Each of these factors
   changes the ideal ratio settings. If you know the following pieces of
   information, you can use the CF Sizer tool to estimate the amount of storage
   that is required for the current CF level:
   - The maximum number of buffers that are defined in your IMSplex (including
     control regions and DL/I batch jobs)
   - The number of blocks that you want to cache
   - The average size of the blocks

**Results**

The CF Sizer tool provides a method to determine an appropriate structure size,
but the tool does not provide the directory and element ratios that are required to
properly use the structure. IMS Buffer Pool Analyzer provides all of the
information that is required to properly size and allow IMS to use the coupling
facility structure.

When IMS Buffer Pool Analyzer calculates estimates for storage sizes, it uses
storage amounts that are based on the coupling facility software level that was
active when your trace data was created.

If you upgrade your CF level after trace data is created, either recreate trace data
or use the CF Sizer tool to estimate storage requirements.

---

**Using IMS Buffer Pool Analyzer for an IMS OSAM cache**

IMS Buffer Pool Analyzer can help you determine the appropriate choices for an IMS OSAM cache configuration.

IMS Buffer Pool Analyzer can display the number of buffers that are associated with a particular structure size, and what directory ratio and element ratio are the most efficient for each structure size. IMS Buffer Pool Analyzer can also help you make decisions about which subpools to cache by allowing you to choose a subpool to cache and by modeling the resulting configuration. You can also create a new subpool, assign specific databases to the new subpool, and model the cache for just the new subpool.

The IMS Buffer Pool Analyzer coupling facility report provides information about IMS OSAM cache configuration and performance. Generating the IMS Buffer Pool Analyzer coupling facility report is a two-step process. First, you gather appropriate trace data from subsystems in the IMSPlex. Then, use the coupling facility report job to display configuration and performance information about the environment.

**How trace data is obtained for coupling facility reports**

The IMS Buffer Pool Analyzer trace data is obtained for an IMS OSAM cache the same way that it is obtained for a buffer pool analysis.

You can use the same trace files for both reporting jobs. For more information about creating trace data, see [Chapter 3, “Gathering trace data,” on page 17](#).

To improve the accuracy of the coupling facility reports, include trace data from each IMS subsystem that participates in the data sharing environment. Unlike the buffer pool reporting process, the coupling facility reporting process accepts input from different IMS subsystems and DL/I batch jobs.

When you create trace files for the coupling facility reporting process, specify similar trace durations for each subsystem to improve the accuracy of those reports. For example, if one subsystem has 20 minutes of trace data and a second subsystem has only 5 minutes of trace data, the reporting will be skewed to favor the subsystem with the longer duration. The trace data does not need to be created at the same time for each subsystem, although if you use IMS shared queues, using traces from each subsystem at the same time will provide a more accurate analysis.

**Coupling facility reports**

IMS Buffer Pool Analyzer’s coupling facility report is a batch reporting process that reads data from all of the trace files that are provided.

IMS Buffer Pool Analyzer’s coupling facility reports on your current configuration and provides projections that you can use to determine what changes in your IMS OSAM caching configuration will benefit performance.
BPLCF coupling facility report

The IMS Buffer Pool Analyzer coupling facility (BPLCF) report provides information about your current IMS OSAM data caching environment and projections on the effect of making changes to your configuration.

You can determine what effects the following types of changes will have on your environment:
- Changing the size of the IMS OSAM cache structure
- Changing the directory ratio and element ratio
- Changing the subpools that are cached in the coupling facility
- Changing which database data sets are included in which IMS subpools

These options allow you to create models that reflect possible IMS OSAM caching configurations. The reports that are created for each model show the performance information for that configuration, which allows you to determine whether the modeled configuration achieves your objectives.

BPLCF JCL

You can generate a coupling facility report by running the batch coupling facility report job.

The following sample JCL is included in the SBPLSAMP library in member BPLCF.

```plaintext
//BPLCF JOB
///
/// This job runs the Buffer Pool Analyzer coupling facility report.
///
/// SET SBPLINK=BPL140.SBPLINK SBPLINK DSN
/// SET ITKBSRVR= OPTIONAL ITKB SERVER NAME
///
/// Any number of GTF trace data sets may be included in each
/// execution of the reporting utility. Each GTF trace data set must
/// be allocated to a DD statement that begins with DDNAME TRACE. If
/// there were three GTF trace data sets, a report execution could
/// include DDNAMES TRACE1, TRACE2, and TRACEXYZ.
///
///BPL EXEC PGM=BPLMAIN,REGION=64M,PARM='ITKBSRVR=ENT!'
//STEPLIB DD DSN=ENT*,DISP=SHR
//SYSPRINT DD SYSOUT=*
//GTFRPT DD SYSDUMP=S
//SPLRPT DD SYSDUMP=S
//MDLRPT DD SYSDUMP=S
//DBORPT DD SYSDUMP=S
//DSNRPT DD SYSDUMP=S
//SYSDUMPDD DD SYSDUMP=S
//TRACE1 DD DSN=???,DISP=SHR
//TRACEXYZ DD DSN=???,DISP=SHR
//DFSVSAMP DD DUMMY
//SYSIN DD DUMMY
///
```

Figure 35. Sample JCL for running the coupling facility report job

You can define the following symbolic parameters in the sample job.
SBPLINK
The SBPLINK symbolic parameter sets the data set name of the IMS Buffer Pool Analyzer load library that is used in the STEPLIB DD statement.

ITKBSRVR
You can use the optional ITKBSRVR parameter to set the IMS Tools Knowledge Base server name on the LPAR where the report job will run. If IMS Tools Knowledge Base is not used in your installation, or if you do not want to write the coupling facility report to the knowledge base repository, leave this symbolic parameter blank.

The following DD names are included in the JCL for the Buffer Pool report:

STEPLIB
Required DD statement that must refer to a data set that contains the IMS Buffer Pool Analyzer load modules. The library does not require APF authorization for any batch report jobs.

SYSPRINT
Print output file for error messages and SYSIN control statements. This DD statement is required. The DCB information for this DD statement, which does not need to be specified, is RECFM=FBA,LRECL=133.

GTFRPT
Print output file for the GTF Trace report. If you do not specify this DD statement, the GTF trace report will not be produced. DCB information is not required, but is RECFM=FBA,LRECL=133.DSORG=PS.

SPLRPT
Print output file for the current configuration (actual) coupling facility reports. If you do not specify this DD statement, the current configuration reports will not be produced. DCB information is not required, but is RECFM=FBA,LRECL=133.DSORG=PS.

MDLRPT
Print output file for the model configuration coupling facility reports, if an alternate configuration was requested in a DFSVSAMP DD statement or a CHANGE DBD statement in the SYSIN DD. If you do not specify this DD statement, the model subpool report will not be produced. DCB information is not required, but is RECFM=FBA,LRECL=133.DSORG=PS.

DSNRPT
Print output file for the Data Set Information report. You can disable this report by using the SYSIN statement DSNRPT=NO. If you do not specify this DD statement, the Data Set Information report will not be produced. DCB information is not required, but is RECFM=FBA,LRECL=133.DSORG=PS.

SYSUDUMP
Diagnostic information. If an abend occurs, the information that is produced by specifying this DD statement can be useful for troubleshooting purposes.

TRADECL
You can include an unlimited number of TRACEDD DD names in the report job. The last three characters of the DD name can be any characters that are valid in JCL. All of the specified trace data sets are read and combined for reporting purposes. At least one TRACEDD DD statement is required.
**Restriction:** Each TRACExxx DD statement can have only one trace data set. Concatenated data sets are not supported. To include multiple trace data sets, code each data set with a different DD name.

**DBDRPT**
Optional DD statement that can be used to specify an alternate configuration to model. When provided, this data set must contain IMS buffer pool definition statements, as described in the IMS System Definition Guide, [http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.ims10.doc.pdf/dfssdgh0.pdf?noframes=true](http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.ims10.doc.pdf/dfssdgh0.pdf?noframes=true) and IMS Buffer Pool Analyzer control statements described in “DFSVSAMP statements.”

**SYSIN**
Optional DD that can be used to specify IMS Buffer Pool Analyzer coupling facility report options. When provided, this data set must contain IMS Buffer Pool Analyzer statements, as described in “SYSIN statements” on page 71.

**DFSVSAMP statements**
You can use IMS Buffer Pool Analyzer to specify an alternate configuration to model. The DFSVSAMP DD statement allows you to change the buffer pool configuration of each IMS subsystem that is traced.

You can update the configuration of each subsystem in the IMSplex because the buffer pool configuration specifies which subpools to cache and which database data sets to include in each subpool.


Identify the subsystem that each set of buffer pool statements applies to because you can include buffer pool specifications from multiple subsystems in the DFSVSAMP file. Use the IMSID and JOBNAME statements before each set of buffer pool specifications to identify the subsystem to which the buffer pool statements apply.

The following example shows a DFSVSAMP DD statement for the coupling facility report.
The DFSVSAMP DD statement can contain the following statements:

**OSAM_STR_SIZE**

The OSAM_STR_SIZE statement is an optional statement. If OSAM_STR_SIZE is not specified, IMS Buffer Pool Analyzer uses the same structure size that was present during the trace. The statement must begin in column one and should not have any blanks embedded in the statement.

The syntax of the OSAM_STR_SIZE statement is:

```
OSAM_STR_SIZE (number)
```

The number variable is the number of kilo-bytes to allocate to the structure. For example, if your desired structure size is 32,768K, specify OSAM_STR_SIZE=32768.

The value of number is used in the model reports that are generated to the MDLRPT output report file.

**IMSID**

The IMSID statement (or JOBNAME statement) must be included before any IMS DFSVSAMP buffer pool statements are specified.

The IMSID statement is used to identify which subsystem will have the buffer pool specifications that are described in this section. All buffer pool specifications that follow the IMSID statement apply to the named IMSID. The buffer pool statements that apply to the specified subsystem end when the next IMSID statement or JOBNAME statement is encountered.

```
//DFSVSAMP DD *
OSAM_STR_SIZE=8192

IMSID=IMB1
VSRBF=2048,800
VSRBF=4096,1600
VSRBF=8192,500
VSRBF=12288,200
IOBF=(4096,1000,N,N,004K)
IOBF=(8192,200,N,N,008K,A)
IOBF=(12288,200,N,N,012K,A)
CFNAMES,CFIRLM=IRLM_CF_NAME_16B
CFNAMES,CFVSAM=VSAM,CFOSAM=(OSAM,1,4)

IMSID=IMB2
VSRBF=2048,800
VSRBF=4096,1600
VSRBF=8192,500
VSRBF=12288,200
IOBF=(4096,1000,N,N,004K)
IOBF=(8192,200,N,N,008K,A)
IOBF=(12288,200,N,N,012K,A)
CFNAMES,CFIRLM=IRLM_CF_NAME_16B
CFNAMES,CFVSAM=VSAM,CFOSAM=(OSAM,1,4)

JOBNAME=BATCH1
VSRBF=8192,50
IOBF=(4096,1000,N,N,004K)
IOBF=(8192,200,N,N,008K,A)
IOBF=(12288,200,N,N,012K,A)
CFNAMES,CFIRLM=IRLM_CF_NAME_16B
CFNAMES,CFVSAM=VSAM,CFOSAM=(OSAM,1,4)
/*
Figure 36. Sample DFSVSAMP specification for the coupling facility report

The DFSVSAMP DD statement can contain the following statements:

**OSAM_STR_SIZE**

The OSAM_STR_SIZE statement is an optional statement. If OSAM_STR_SIZE is not specified, IMS Buffer Pool Analyzer uses the same structure size that was present during the trace. The statement must begin in column one and should not have any blanks embedded in the statement.

The syntax of the OSAM_STR_SIZE statement is:

```
OSAM_STR_SIZE (number)
```

The number variable is the number of kilo-bytes to allocate to the structure. For example, if your desired structure size is 32,768K, specify OSAM_STR_SIZE=32768.

The value of number is used in the model reports that are generated to the MDLRPT output report file.

**IMSID**

The IMSID statement (or JOBNAME statement) must be included before any IMS DFSVSAMP buffer pool statements are specified.

The IMSID statement is used to identify which subsystem will have the buffer pool specifications that are described in this section. All buffer pool specifications that follow the IMSID statement apply to the named IMSID. The buffer pool statements that apply to the specified subsystem end when the next IMSID statement or JOBNAME statement is encountered.
The **IMSID** statement must begin in column one. No embedded blanks are permitted in the statement. The specified value must be four characters or less.

**Restriction:** For an IMS control region (either DB/TM or DBCTL), you must utilize the **IMSID** statement, not the **JOBNAME** statement.

The syntax of the **IMSID** statement is:

```
IMSID= name
```

**JOBNAME**

The **JOBNAME** statement (or **IMSID** statement) must be included before any IMS DFSVSAMP buffer pool statements are specified.

Use the **JOBNAME** statement to identify the DL/I batch jobname that will have the buffer pool specifications that follow. All buffer pool specifications that follow the **JOBNAME** statement apply to that job. The buffer pool statements that apply to the specified job name end when the next **IMSID** statement or **JOBNAME** statement is encountered. The following rules apply to the **JOBNAME** statement:

- It must begin in column one.
- No embedded blanks are permitted.
- The value that is specified must be 8 characters or less.

**Requirement:** For either a DB/TM or DBCTL IMS control region you must use the **IMSID** statement, not the **JOBNAME** statement.

The **JOBNAME** statement can be used only to specify an IMS DL/I batch job name.

The syntax of the **JOBNAME** statement is:

```
JOBNAME= jobname
```

**SYSIN statements**

You can include multiple **BUFNO** statements in the SYSIN DD of a coupling facility report job to customize the output that is produced.

The SYSIN DD statement is optional. Most SYSIN statements cannot be continued to multiple lines. The exception is the **BUFNO** statement, which can be continued on as many lines as are necessary.

The following is the syntax of the **BUFNO** statement:

```
BUFNO type= (number,number,...)
```

The **BUFNO** statement allows you to customize the subpool reports that display performance metrics for different numbers of buffers. The **BUFNO** statement allows you to replace the default number of buffers with numbers that you choose. You can specify different numbers of buffers for OSAM, VSAM, and VSAM with hiperspace, DEDB subpools, and in the OSAM cache. The **type** parameter in the **BUFNO** statement specifies the type of subpools for which the numbers of buffers will be used. You can specify the following **type** parameters in each **BUFNO** statement:

- **OSAM**=
- **VSAM**=
- **HIPERSPACE**= (or **HS**)=
- **DEDB**=

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In addition to the `type=` parameter, you must specify up to 45 different numbers of buffers. Each number can range from 3 to 32768 for OSAM and VSAM or from 3 to 999999 for Hiperspace(TM), DEDB, or CF types. The following figure shows the default numbers of buffers for OSAM, VSAM, HIPERSPACE, DEDB, and CF:

```
BUFNO OSAM = (4, 8, 16, 32, 64, 128, 192, 256, 384, 512, 768, 1024, 1536,
              2048, 3072, 4096, 6144, 8192, 12288, 16384, 20480, 24576,
              28672, 32768)

BUFNO VSAM = (4, 8, 16, 32, 64, 128, 192, 256, 384, 512, 768, 1024, 1536,
               2048, 3072, 4096, 6144, 8192, 12288, 16384, 20480, 24576,
               28672, 32768)

BUFNO HIPERSPACE = (4, 8, 16, 32, 64, 128, 192, 256, 384, 512, 768, 1024,
                   1536, 2048, 3072, 4096, 6144, 8192, 12288, 16384,
                   20480, 24576, 28672, 32768, 40960, 49152, 57344,
                   65535, 81920, 98302, 131072, 163840, 196608, 262144)

BUFNO DEDB = (4, 8, 16, 32, 64, 128, 192, 256, 384, 512, 768, 1024,
              2048, 3072, 4096, 6144, 8192, 12288, 16384, 20480, 24576,
              28672, 32768)

BUFNO CF = (64, 128, 192, 256, 384, 512, 768, 1024, 1536, 2048, 3072, 4096, 6144,
            8192, 12288, 16384, 20480, 24576, 28672, 32768, 40960, 49152,
            57344, 65536, 81920, 98302)
```

Figure 37. Default numbers of buffers for various database types

You can specify as many of the five types of BUFNO statements as you need. For example, you can include only `OSAM=` and `VSAM=` statements and allow `hiperspace`, `DEDB`, and `CF` values to default to their default values. BUFNO statements are the only SYSIN statements that can be continued. Only columns 1 through 72 are treated as data. To continue a BUFNO statement, simply ensure that the last non-blank characters in columns 1 through 72 is a comma. A complete BUFNO statement is identified by a closing parenthesis.

**Tip:** The largest number for each type determines the number of buffer slots that are tracked during processing of the Buffer Pool report job. Specifying a very large value can significantly increase the job's processing time.

The following examples show valid BUFNO statements:

```
//SYSIN DD *
BUFNO OSAM = (3, 32, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 2000,
           3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000, 20000,
           30000)
BUFNO CF = (100, 200, 300, 400, 500, 600, 700, 800, 900, 1000,
         2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000, 20000,
         30000, 40000, 50000, 60000)
```

Figure 38. Examples of valid BUFNO statements

**Coupling facility report print DD names**

IMS Buffer Pool Analyzer's coupling facility analysis job produces a variety of reports that are written to different print DD names.
The following DD names are used for IMS Buffer Pool Analyzer coupling facility report output:

**SYSPRINT**
SYSPRINT includes diagnostic messages that describe any error conditions that are encountered during processing, and a list of the statements that are supplied in the SYSIN DD statement that are specified to control the options that are used to generate the report.

**GTFRPT**
GTFRPT includes the generalized trace facility (GTF) report that describes the GTF trace data sets that are supplied as input to this coupling facility report.

**SPLRPT**
SPLRPT contains the coupling facility reports. These reports document the current IMS OSAM cache coupling facility environment. If a DFSVSAMP DD statement is used to specify an alternate environment, the MDLRPT DD name contains reports that document the alternate environment. The coupling facility reports include OSAM coupling facility cache detail, OSAM summary subpool information, and detailed information about each OSAM subpool in the configuration.

**MDLRPT**
MDLRPT contains coupling facility reports for the alternate configuration that is requested in the DFSVSAMP DD statement. The coupling facility reports include OSAM coupling facility cache detail, OSAM summary subpool information, and detailed information about each OSAM subpool in the configuration.

**DSNRPT**
DSNRPT contains the data set report for OSAM data sets. These reports provide a list of the databases that are used during the trace interval, their DD names, and data set names. This optional report can be suppressed by including DSNRPT=NO in the SYSIN.

---

**GTF trace report**

The Generalized Trace facility (GTF) report shows time stamps and the number of records for each GTF trace data set that is included in the report job.

The GTF trace report also provides information about lost records and lost blocks. Lost records occur when GTF buffers fill, and no buffer space is available for additional trace records. Lost blocks typically occur during write errors to the trace data set or during periods of very high trace activity. After trace buffers become available, GTF writes an error record that provides information about the number of trace records that were discarded for lack of buffer space. The report shows both the number of GTF error records and the total number of trace records that were discarded.

The following figure shows an example GTF trace report that includes two input GTF trace data sets. For each trace data set the following types of information are shown:

- The data set names
- The subsystem names
- The start and end times of the trace data
- The elapsed time of each trace
The number of records of each type are also shown.

### GTF Trace Report

The GTF trace report includes the following information fields:

**CONTROL**
- GTF control records that are produced by GTF but are not used by IMS Buffer Pool Analyzer.

**BFR POOL ANAL**
- Records that are generated by IMS Buffer Pool Analyzer. Records can include information about subpool definitions, database data set information, control records, or DEDB lookaside buffer activity.

**OSAM/VSAM**
- OSAM trace records that are produced by the IMS Buffer Pool Analyzer or VSAM trace records that are produced by VSAM processing.

**UNKNOWN TYPE**
- GTF trace records with an event ID that does not match any record types that IMS Buffer Pool Analyzer processes (440 - Buffer Pool Analyzer records, F4F - IMS OSAM records, and F61 - VSAM records). There should be no records in this category. If the report indicates the presence of unknown records, investigate the event ID that is associated with the records, determine the source of the record type, and disable recording the records. For assistance, contact the IBM Software Service center.

**LOST RECORDS**
- Records that were discarded because of insufficient buffer space. The number of records shows how many occurrences of lost records were

---

### GTF Trace Data for Subsystem IMS IMB2

<table>
<thead>
<tr>
<th>GTF Record Type</th>
<th>Number Records</th>
<th>Start Time</th>
<th>End Time</th>
<th>Elapsed Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL</td>
<td>54</td>
<td>2013.224</td>
<td>8:50:45</td>
<td>2013.224</td>
</tr>
<tr>
<td>BFR POOL ANAL</td>
<td>5,868</td>
<td>2013.224</td>
<td>8:50:47</td>
<td>2013.224</td>
</tr>
<tr>
<td>UNKNOWN TYPE</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOST RECORDS</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOST BLOCKS</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>7,722</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### GTF Trace Data for Subsystem IMS IMB1

<table>
<thead>
<tr>
<th>GTF Record Type</th>
<th>Number Records</th>
<th>Start Time</th>
<th>End Time</th>
<th>Elapsed Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL</td>
<td>221</td>
<td>2013.074</td>
<td>14:26:12</td>
<td>2013.074</td>
</tr>
<tr>
<td>BFR POOL ANAL</td>
<td>4,157</td>
<td>2013.074</td>
<td>14:26:14</td>
<td>2013.074</td>
</tr>
<tr>
<td>OSAM</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VSAM</td>
<td>52,891</td>
<td>2013.074</td>
<td>14:27:37</td>
<td>2013.074</td>
</tr>
<tr>
<td>UNKNOWN TYPE</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOST RECORDS</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOST BLOCKS</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>57,269</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 39. Sample report: GTF trace*

The GTF trace report includes the following information fields:

- **CONTROL**
  - GTF control records that are produced by GTF but are not used by IMS Buffer Pool Analyzer.

- **BFR POOL ANAL**
  - Records that are generated by IMS Buffer Pool Analyzer. Records can include information about subpool definitions, database data set information, control records, or DEDB lookaside buffer activity.

- **OSAM/VSAM**
  - OSAM trace records that are produced by the IMS Buffer Pool Analyzer or VSAM trace records that are produced by VSAM processing.

- **UNKNOWN TYPE**
  - GTF trace records with an event ID that does not match any record types that IMS Buffer Pool Analyzer processes (440 - Buffer Pool Analyzer records, F4F - IMS OSAM records, and F61 - VSAM records). There should be no records in this category. If the report indicates the presence of unknown records, investigate the event ID that is associated with the records, determine the source of the record type, and disable recording the records. For assistance, contact the IBM Software Service center.

- **LOST RECORDS**
  - Records that were discarded because of insufficient buffer space. The number of records shows how many occurrences of lost records were
OSAM data set information reports

The OSAM data set information reports display the data sets that are associated with the performance reports.

The coupling facility version of the OSAM data set report shows only the OSAM data sets that are defined in cached subpools.

The OSAM data set information reports are optional. You can suppress these reports by supplying a DSNRPT=NO statement in the SYSIN DD statement.

OSAM data set information reports provide information about data set names that can be referenced by the batch jobs and subsystems. Only those data sets that can be used are displayed:

- For batch jobs, the list includes every DBD in the PSB that has a database data set that is either present in the job's JCL, or available for dynamic allocation by DFSMDA members or from information in the RECON data sets for Fast Path and HALDB databases.
- For online systems, the list includes data set names for every database data set that has a valid ACBLIB member, including data set names that are available from the JCL, DFSMDA members, or data set names that are available from RECON definitions.

The following figure is an example OSAM data set information report. Information about block size is presented only for data sets that were active during the trace interval.

<table>
<thead>
<tr>
<th>DBDNAME</th>
<th>NUM</th>
<th>TYPE</th>
<th>HALDBD</th>
<th>SIZE</th>
<th>DDNAME</th>
<th>DSNAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUSTD4</td>
<td>1</td>
<td>DL/I</td>
<td>8,192</td>
<td>CUSTD4</td>
<td>BPA1.CUSTD4.HIDAM</td>
<td></td>
</tr>
<tr>
<td>PDB1001</td>
<td>A</td>
<td>PART</td>
<td>CUSTOMRA</td>
<td>8,192</td>
<td>PDB1001A</td>
<td>BPA1.DBD1.A00001</td>
</tr>
<tr>
<td>PDB1002</td>
<td>A</td>
<td>PART</td>
<td>CUSTOMRA</td>
<td>8,192</td>
<td>PDB1002A</td>
<td>BPA1.DBD1.A00002</td>
</tr>
<tr>
<td>PDB1003</td>
<td>A</td>
<td>PART</td>
<td>CUSTOMRA</td>
<td>8,192</td>
<td>PDB1003A</td>
<td>BPA1.DBD1.A00003</td>
</tr>
<tr>
<td>PDB1004</td>
<td>A</td>
<td>PART</td>
<td>CUSTOMRA</td>
<td>8,192</td>
<td>PDB1004A</td>
<td>BPA1.DBD1.A00004</td>
</tr>
<tr>
<td>PDB1005</td>
<td>A</td>
<td>PART</td>
<td>CUSTOMRA</td>
<td>8,192</td>
<td>PDB1005A</td>
<td>BPA1.DBD1.A00005</td>
</tr>
<tr>
<td>PDB1006</td>
<td>A</td>
<td>PART</td>
<td>CUSTOMRA</td>
<td>8,192</td>
<td>PDB1006A</td>
<td>BPA1.DBD1.A00006</td>
</tr>
<tr>
<td>PDB1007</td>
<td>A</td>
<td>PART</td>
<td>CUSTOMRA</td>
<td>8,192</td>
<td>PDB1007A</td>
<td>BPA1.DBD1.A00007</td>
</tr>
<tr>
<td>PDB1008</td>
<td>A</td>
<td>PART</td>
<td>CUSTOMRA</td>
<td>8,192</td>
<td>PDB1008A</td>
<td>BPA1.DBD1.A00008</td>
</tr>
</tbody>
</table>

Figure 40. Sample report: OSAM data set information

The OSAM data set information report includes the following fields:

**DBDNAME**

The database name.
DCB NUM
The DCB number within the database for this data set, or the HALDB partition ID.

DB TYPE
The type of database. DL/I indicates a full function database. PART indicates a partition of a HALDB.

MASTER HALDB
This field is blank unless the database is a HALDB partition. For partitioned databases, the master HALDB database name of which this partition is a member. This field is blank unless the database is a HALDB partition.

BLOCK SIZE
The data set block size. This block size does not reflect updates to the database that are specified in a CHANGE statement included in the SYSIN statements.

DDNAME
The DD name that is used by this database data set.

DSNAME
The data set name of the database data set.

 Coupling facility cache reports

IMS Buffer Pool Analyzer can produce either one or two sets of coupling facility cache reports.

Several types of reports are created and the first of these reports are written to the DD name SPLRPT document in the IMS coupling facility cache configuration that was in place at the time trace data was gathered. The second set of coupling facility cache reports are written if you requested a change to the configuration through the DFSVSAMP DD statement, or a if you requested a change to the database access method or block size through a CHANGE statement in the SYSIN DD statement. The same type of reports are produced for both the actual configuration that is written to the SPLRPT DD output and to the model configuration that is written to the MDLRPT DD output.

OSAM coupling facility cache detail report

Several types of reports are created. The first reports in the SPLRPT and MDLRPT DD statements show detailed coupling facility cache configuration and usage information.

The following figure is an example of these OSAM coupling facility cache detail reports.
The OSAM coupling facility cache detail reports include the following fields:

**OSAM STRUCTURE NAME**
The name of the OSAM cache structure, as it is specified in the DFSVSMxx member of PROCLIB.

**COUPLING FACILITY NAME**
The name of the coupling facility in which the OSAM cache structure was allocated.

**STRUCTURE SIZE**
The size of the OSAM cache structure.

**DIRECTORY RATIO**
The directory ratio. For DD name SPLRPT, the directory ratio is obtained from IMS control blocks. For DD name MDLRPT, the directory ratio is taken from DFSVSAMP if it is supplied in the report job; otherwise, the value that is obtained from IMS control blocks is used.

**DIRECTORY ENTRIES**
The approximate number of directory entries in the structure. This value is based on the level of software that is running in the coupling facility when the trace is taken.

**ELEMENT RATIO**
The element ratio. For DD name SPLRPT, the element ratio is obtained from IMS control blocks. For DD name MDLRPT, the element ratio is taken from DFSVSAMP if it is supplied in the report job; otherwise, the value that is obtained from the IMS control blocks is used.
ELEMENT ENTRIES
   The approximate number of elements in the structure. This value is based on the level of software that is running in the coupling facility when the trace is taken.

BUFFER REQUESTS
   The number of times, and the number of times per second, that one of the subsystems that is sharing the OSAM cache structure needed a database block that was not present in that subsystem’s local buffer pools.

BUFFER HITS
   The number of times, and the number of times per second, that a database block that is required by a subsystem was available in the OSAM cache structure.

BUFFER READS
   The number of times, and the number of times per second, that a database block that is required by a subsystem was not available in the OSAM cache structure.

HIT RATIO
   The percentage of times that a required database block was found in the OSAM cache structure.

BUFFER LIFE
   The length of time that a database block remains in the cache structure without being referenced.

NUMBER OF OSAM BUFFERS
   The number of both cached and non-cached buffers that are present in the trace data. For the Model report, in the MDLRPT DD statement, this number includes all of the OSAM buffers that are defined in all the subsystems in trace data or in the DFSVSAMP DD statement. This number is presented as an input to the CF Sizer tool.

   This number of OSAM buffers represents the maximum number of buffers that are used by all of the subsystems that are participating in the IMSplex.

AVG BUF SIZE OF CACHED DATA
   The average buffer size of blocks that are written to the coupling facility structure. The CF Sizer tool uses this number to determine the number of elements that are required to fit an average data base block that is to be cached.

STRUCTURE OVERHEAD
   The amount of storage that is used in the coupling facility structure for internal control blocks and data. The value that is listed is an approximate value that is determined during the trace process. The value varies depending on the coupling facility software maintenance level.

DIRECTORY SIZE
   The amount of storage that is required for each directory entry in the coupling facility structure. A directory entry is used to track the status of a single database buffer. One directory entry is required for each OSAM buffer that is used by an IMS subsystem in the IMSplex, and for each buffer that is resident in the coupling facility cache.

ELEMENT SIZE
   The size of each element in the coupling facility structure. Elements are used to store the actual database buffer. Each element in the IMS OSAM
cache is always 2048 bytes. From 1 to 16 elements are used to store each buffer, depending on the size of each buffer.

**NUMBER OF OSAM BUFFERS**

The number of OSAM buffers that are used by IMS subsystems and included in the trace data or specified in the DFSVSAMP input. This value is broken down into cached and non-cached buffers.

**Requirement:** A directory entry is required for each OSAM buffer in each IMS subsystem in the IMSplex, either cached or non-cached. Elements are used only for cached buffers.

**Model of varying cache sizes report**

The model of varying cache sizes displays projections for performance metrics for differing amounts of storage that can be allocated to the cache structure.

The number of buffers and structure size indicate the amount of coupling facility storage that is used by the structure. For each structure size, the recommended ratios for directory entries (DIR) and element entries (ELE) are shown. The hit ratio, reads per second, and buffer life show the effect of changing the structure size to the value on each line of the report.

The following figure is an example of the Model of varying cache sizes for actual cache configuration report.

**MODEL OF VARYING CACHE SIZES FOR ACTUAL CACHE CONFIGURATION:**

<table>
<thead>
<tr>
<th>NUMBER BUFFERS</th>
<th>STRUCTURE SIZE (KB)</th>
<th>RATIOS</th>
<th>HITS</th>
<th>READS PER SECOND</th>
<th>BUFFER LIFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4,520</td>
<td>1</td>
<td>0</td>
<td>12.30</td>
<td>0.00</td>
</tr>
<tr>
<td>64</td>
<td>4,988</td>
<td>79</td>
<td>16</td>
<td>9.22</td>
<td>6.93</td>
</tr>
<tr>
<td>128</td>
<td>5,520</td>
<td>83</td>
<td>32</td>
<td>8.64</td>
<td>14.81</td>
</tr>
<tr>
<td>192</td>
<td>6,052</td>
<td>29</td>
<td>16</td>
<td>8.18</td>
<td>23.46</td>
</tr>
<tr>
<td>256</td>
<td>6,584</td>
<td>91</td>
<td>64</td>
<td>7.69</td>
<td>33.30</td>
</tr>
<tr>
<td>384</td>
<td>7,644</td>
<td>33</td>
<td>32</td>
<td>6.79</td>
<td>56.58</td>
</tr>
<tr>
<td>512</td>
<td>8,708</td>
<td>107</td>
<td>128</td>
<td>5.77</td>
<td>88.78</td>
</tr>
<tr>
<td>768</td>
<td>10,832</td>
<td>41</td>
<td>64</td>
<td>4.28</td>
<td>179.41</td>
</tr>
<tr>
<td>1,024</td>
<td>12,960</td>
<td>139</td>
<td>256</td>
<td>3.50</td>
<td>292.63</td>
</tr>
<tr>
<td>1,536</td>
<td>17,208</td>
<td>57</td>
<td>128</td>
<td>3.49</td>
<td>440.62</td>
</tr>
<tr>
<td>2,048</td>
<td>21,460</td>
<td>203</td>
<td>512</td>
<td>3.49</td>
<td>587.50</td>
</tr>
<tr>
<td>3,072</td>
<td>29,960</td>
<td>89</td>
<td>256</td>
<td>3.49</td>
<td>881.25</td>
</tr>
<tr>
<td>4,096</td>
<td>38,460</td>
<td>165</td>
<td>512</td>
<td>3.49</td>
<td>1175.00</td>
</tr>
</tbody>
</table>

*Figure 42. Sample report: Model of varying cache sizes for actual cache configuration*

**Databases with activity in the cache report**

The Databases with activity in the cache report displays the names of the databases that have had activity in the OSAM cache subpool structure.

The following sample report also shows activity rates (requests and reads per second) and hit ratios for each of the database data sets with database blocks in the cache.
The database subpool summary report displays all of the OSAM database buffer subpools that are present in each subsystem.

The Database subpool summary shows, both the cached subpools and the uncached subpools because uncached subpools still require directory entries in the OSAM cache structure for cross invalidation processing.

The following figure shows an example of a database subpool summary report.

```
<table>
<thead>
<tr>
<th>SUBSYS</th>
<th>BUFFER SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMS IMB1</td>
<td>4,096 004K</td>
</tr>
<tr>
<td>IMS IMB1</td>
<td>8,192 008K</td>
</tr>
<tr>
<td>IMS IMB1</td>
<td>12,288 012K</td>
</tr>
<tr>
<td>IMS IMB2</td>
<td>4,096 004K</td>
</tr>
<tr>
<td>IMS IMB2</td>
<td>8,192 008K</td>
</tr>
<tr>
<td>IMS IMB2</td>
<td>12,288 012K</td>
</tr>
</tbody>
</table>
```

Figure 44. Sample report: Database subpool summary

Performance metrics are gathered only for subpools that are cached. Uncached subpools are shown with the message SUBPOOL NOT CACHED in place of the performance information. The subpool summary report sample shows the following information:

**SUBSYS**

The name of the subsystem that was obtained from trace files or from IMS buffer pool statements in the DFSVSAMP DD statement in the report job. For an IMS control region, the name is IMS followed by the IMSID. For a DL/I batch job, SUBSYS is the jobname.

**BUFFER SIZE**

The buffer size of the IMS subpool.

**SUB-POOL**

The subpool name that is defined in that IMS subsystem.

**CF**

The coupling facility cache option.
• Blank indicates that the CF is not cached.
• C- indicates that the changed database blocks are cached.
• A- indicates that all of the database blocks are cached.

**NUMBER BUFFERS**
The number of buffers that are allocated to the subpool.

**REQUESTS PER SECOND**
The number of database block requests per second for the subsystem’s subpool.

**READS PER SECOND**
The number of buffer misses when the buffer is not found in the subpool. The number of reads per second equates to the number of OSAM cache requests per second.

**HIT RATIO**
The percentage of buffer requests that are met from the subsystem’s buffer pool.

**BUFFER LIFE**
The average duration that an unreferenced buffer remains in the subpool.

**MARGINAL REDUCTION**
The marginal reduction value indicates how effectively each subpool could use additional storage. A large number indicates a subpool that could have a lower I/O rate if it had more storage. A subpool with a marginal reduction of 0 indicates that adding storage would not improve the performance significantly.

**Subpool detail report**
IMS Buffer Pool Analyzer provides detailed information about performance for each subpool that is defined.

The subpool detail report includes the following four sections:
• Actual subpool configuration
• Actual subpool performance
• Model of varying buffer pool sizes for actual subpool configuration
• Databases with activity in this subpool

The following figure shows an example subpool detail report:
**Actual Subpool Configuration:**
- **IMSID/JobName:** IMS ZICA
- **Buffer Size:** 4,096 VSAM INDEX
- **Buffer Pool ID:** DFLT
- **Number Buffers:** 4,000

**Actual Subpool Performance:**
- **Buffer Requests:** 2,661,697 at 8,837.27 per second
- **Buffer Pool Hits:** 2,365,445 at 7,853.66 per second (88.8%)
- **Buffer Reads:** 296,252 at 983.61 per second (11.1%)
- **Hit Ratio:** 88.8%
- **Buffer Life:** 4.06 seconds
- **Marginal Reduction:** 124

**Model of Varying Buffer Pool Sizes for Actual Subpool Configuration:**

<table>
<thead>
<tr>
<th>Buffers</th>
<th>Pool Size</th>
<th>Hit Ratio</th>
<th>Hits per Second</th>
<th>Life</th>
<th>Marginal Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>16K</td>
<td>18.2%</td>
<td>7,221.91</td>
<td>0.00</td>
<td>41,512</td>
</tr>
<tr>
<td>100</td>
<td>400K</td>
<td>68.3%</td>
<td>2,793.87</td>
<td>0.03</td>
<td>4,281</td>
</tr>
<tr>
<td>200</td>
<td>800K</td>
<td>73.7%</td>
<td>2,318.18</td>
<td>0.08</td>
<td>1,867</td>
</tr>
<tr>
<td>300</td>
<td>1,200K</td>
<td>76.1%</td>
<td>2,110.66</td>
<td>0.14</td>
<td>1,230</td>
</tr>
<tr>
<td>400</td>
<td>1,600K</td>
<td>77.6%</td>
<td>1,973.95</td>
<td>0.20</td>
<td>922</td>
</tr>
<tr>
<td>500</td>
<td>2,000K</td>
<td>78.0%</td>
<td>1,871.40</td>
<td>0.26</td>
<td>720</td>
</tr>
<tr>
<td>600</td>
<td>2,400K</td>
<td>79.7%</td>
<td>1,791.32</td>
<td>0.33</td>
<td>590</td>
</tr>
<tr>
<td>700</td>
<td>2,800K</td>
<td>80.4%</td>
<td>1,725.76</td>
<td>0.40</td>
<td>502</td>
</tr>
<tr>
<td>800</td>
<td>3,200K</td>
<td>81.1%</td>
<td>1,669.96</td>
<td>0.47</td>
<td>429</td>
</tr>
<tr>
<td>900</td>
<td>3,600K</td>
<td>81.6%</td>
<td>1,622.20</td>
<td>0.55</td>
<td>378</td>
</tr>
<tr>
<td>1,000</td>
<td>4,000K</td>
<td>82.1%</td>
<td>1,580.19</td>
<td>0.63</td>
<td>254</td>
</tr>
<tr>
<td>2,000</td>
<td>8,000K</td>
<td>85.3%</td>
<td>1,297.94</td>
<td>1.54</td>
<td>158</td>
</tr>
<tr>
<td>3,000</td>
<td>12,000K</td>
<td>87.3%</td>
<td>1,122.22</td>
<td>2.67</td>
<td>124</td>
</tr>
</tbody>
</table>

**Databases with Activity in this Subpool:**

<table>
<thead>
<tr>
<th>DbName</th>
<th>Dcb</th>
<th>VsAM</th>
<th>Haldb</th>
<th>Ci</th>
<th>Hit Ratio</th>
<th>Requests per Second</th>
<th>Reads per Second</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG15IDF</td>
<td>X</td>
<td>INDEX</td>
<td>PGZ1DF</td>
<td>4,096</td>
<td>79.2%</td>
<td>102.28</td>
<td>21.22</td>
</tr>
<tr>
<td>NIZXCI1X</td>
<td>3</td>
<td>INDEX</td>
<td>4,096</td>
<td>69.2%</td>
<td>58.92</td>
<td>18.13</td>
<td></td>
</tr>
<tr>
<td>NIZXCI2X</td>
<td>3</td>
<td>INDEX</td>
<td>4,096</td>
<td>84.6%</td>
<td>84.59</td>
<td>12.94</td>
<td></td>
</tr>
<tr>
<td>NIZXFDRX</td>
<td>1</td>
<td>INDEX</td>
<td>4,096</td>
<td>57.5%</td>
<td>29.99</td>
<td>12.73</td>
<td></td>
</tr>
<tr>
<td>PGZPMTX</td>
<td>1</td>
<td>INDEX</td>
<td>4,096</td>
<td>97.2%</td>
<td>463.02</td>
<td>12.52</td>
<td></td>
</tr>
</tbody>
</table>

_Figure 45. Sample report: Subpool detail_
The first section of the subpool detail report provides information about the actual subpool configuration. In the preceding example, the actual subpool configuration is displayed, which indicates that this is the IMS configuration that is used during the trace and that is written to the SPLRPT DD data set. The subpool configuration for a model environment that is written to the MDLRPT DD data set would display the following message SUBPOOL CONFIGURATION FROM DFSVSAMP.

The subpool configuration information identifies the IMSID or DL/I batch job name that was traced and the buffer size, buffer pool ID, and number of buffers in the subpool.

The second section of the subpool detail report provides information about the actual subpool performance. The preceding example displays the actual subpool performance that is based on the trace data. If a model configuration is in place, the report message in the MDLRPT DD data set would display DFSVSAMP SUBPOOL CONFIGURATION PERFORMANCE, and the performance metrics would reflect the subpool configuration as it was requested in DFSVSAMP, along with any CHANGE DBD statements that were specified on the SYSIN DD statement.

The performance metrics that are listed in the actual subpool performance section show the number of buffer requests, buffer pool hits, DASD buffer reads, the per-second rates of these metrics, and the percentages of requests that resulted in buffer pool hits, DASD reads, then the hit ratio, buffer life, and marginal reduction value.

The third section of the subpool detail report shows projections for subpool performance metrics for different amounts of storage that are allocated to the subpool, and it displays the resulting performance for different numbers of buffers.
that might be allocated to the subpool. The number of buffers on each line of the
report is determined based on the default numbers of buffers for a subpool. Or,
you can specify the number of buffers on each line using **BUFNO** statements in the
SYSIN DD statement for the report job.

IMS Buffer Pool Analyzer uses the information in performance projections to
review subpool performance and determine whether performance can be improved
by increasing or decreasing the number of buffers that are allocated to each
subpool.

The fourth section of the subpool detail report lists all of the database data sets
that had activity in the subpool, and performance metrics are shown for each data
set. The data sets are presented in order of the highest through the lowest number
of reads-per-second, which means that the highest I/O data sets are displayed first
in each subpool's list of active databases.

---

**Modeling an alternate configuration**

IMS Buffer Pool Analyzer allows you to model buffer pool configuration changes
and produce the subpool reports that are based on this alternate configuration.

You can add, remove, or change subpool definitions, change the association of
database data sets with subpools, and change the block or CI size of a data set.

**Changing the access method or block size of a database**

To model the impact of a change to the access method (OSAM to VSAM, or VSAM
to OSAM), or to the block size of a database data set use the coupling facility
report.

**About this task**

If you plan to make a database change, the coupling facility report lets you review
the impact of the change on your OSAM cache configuration and to plan changes
to your configuration before you actually implement the database change.

To model the impact of a database change, perform the following steps:

**Procedure**

1. Supply one or more **CHANGE DBD** statements in the SYSIN DD statement of
   the coupling facility report job.
2. Run the coupling facility report job.

**Results**

The coupling facility report produces reports for the supplied trace data that
document the performance of the old database configuration (in the SPLRPT DD
statement) and the performance of the new database configuration (in the
MDLRPT DD statement).

**Changes to the IMS buffer pool configuration**

You can specify updated buffer pool configurations for any or all of the IMS
subsystems in your trace files.
Changes to an IMS subsystem’s buffer pool configuration can directly impact the performance of the OSAM cache. The MDLRPT DD output will contain the alternate configuration reports that reflect the updated buffer pools.

**Changing the OSAM cache configuration**

You can update the directory and element ratios by making changes to the buffer pool definition CFNAMES statement.

**About this task**

To update the directory and element ratios, perform the following steps:

**Procedure**

1. Modify and include the updated CFNAMES statement in the report job DFSVSAMP DD statements so that these statements include the alternate configuration model, the updated directory, and element ratios.
2. Alternatively, you can change the OSAM cache structure size and model the impact of the changed structure size.

**Alternate configuration reports**

Each time that the coupling facility alternate configuration report job is run, it can produce either one or two sets of reports.

The first set of alternate configuration reports reflects the actual subpool and OSAM cache configurations, and it is written to the SPLRPT DD output.

The second set of alternate configuration reports, that are referred to as model reports, are produced only if you request a configuration change through the use of a CHANGE DBD statement in the SYSIN DD statement or by specifying any statements in the DFSVSAMP DD statement. The model alternate configuration reports are always written to the MDLRPT DD output.

**Tuning the OSAM coupling facility cache**

Because the it is not the same as an OSAM subpool, there are several methods for tuning the OSAM coupling facility cache.

Increasing the size of a subpool results in longer search time for the subpool (because there are more buffers) and increased storage utilization. No additional I/O is associated with the additional buffers. When a buffer hit occurs in the added buffers, a read I/O is completely eliminated.

Caching requires that blocks be written to the cache when they are read (or updated, depending on the cache option that you select). Writing data to the OSAM coupling facility takes CPU time and I/O. In addition, when a buffer hit occurs an I/O is still required to retrieve the buffer from the coupling facility.

The essential point is that the OSAM cache is not simply an extension to an OSAM subpool. But, because the OSAM coupling facility cache is a shared resource among all IMS subsystems in the data sharing environment, it is not subject to buffer invalidation. So, in some cases, the OSAM coupling facility cache can be more efficient than the OSAM subpools.
There are only three practical tuning options for the OSAM coupling facility cache. These tuning options are as follow:

1. Select the database data sets that are to be cached in the coupling facility structure.
2. Select the directory and element ratios.
3. Select the OSAM cache structure size.

**Select database data sets to be cached**
Choose the database data sets DBDS that you want to isolate and cache.

**Before you begin**
Approach enabling caching very seriously, especially for an initial implementation.

**Procedure**
1. Choose one or a few heavy-update-activity shared OSAM database data sets (DBDS) as candidates for caching.
2. After you select the DBDSs that you want to cache, isolate those data sets to a separate subpool to be cached.
3. Create new DFSVSMxx members for each IMS subsystem in the data sharing environment, without implementing the new member, that assigns the selected DBDSs to the isolated subpool.

**Select the directory and element ratios**
After you have selected or updated the list of DBDSs to be cached, created, and updated DFSVSMxx members, you can use the coupling facility report to determine appropriate values for the directory ratio and element ratio for the size of your coupling facility structure.

**About this task**
To create DFSVSAMP input statements for the coupling facility report job perform the following steps:

**Procedure**
1. Copy the updated DFSVSMxx members that you have created to reflect the updated subpool configuration.
2. Add the IMSID= and JOBNAME= statements between the different DFSVSMxx members.
3. Place updated DFSVSMxx members in the DFSVSAMP file even if you have no trace data for some of the subsystems.
4. If you ever run IMS DL/I batch jobs, also create DFSVSAMP input for batch jobs, so that the number of directory entries in the structure is sufficient.
   a. Create input for JOBNAME=BATCH1 through BATCHxxx, depending on the maximum number of DL/I batch jobs that can execute concurrently in the sysplex.
   b. The subpools for every batch job can be the same; however, ensure that each batch definition has the maximum number of OSAM buffers that any DL/I batch job in your environment has.
5. If you want to leave additional directory entries for expansion of online buffer pools, create another batch job in the DFSVSAMP input stream with the number of OSAM buffers that you want to reserve for expansion.
6. When you have the DFSVSAMP input customized for your new environment, run the coupling facility report with the DFSVSAMP input. The coupling facility report job should have trace files from all of the IMS subsystems in the data sharing environment.

7. To produce the correct mix of workloads so that the average DBDS block size is correct, follow the recommended directory ratio and element ratio values that are displayed in the report output that is defined in the MDLRPT DD statement.

Select the OSAM cache structure size
Review the output of a coupling facility report job and locate the OSAM cache structure detail report in the MDLRPT DD statement specification.

About this task
The cache structure configuration and performance information of the OSAM cache structure detail report provide information about the models of hit ratios with varying buffer sizes. You can use this information as a guide to determine the amount of storage (structure size) that you want to allocate to the structure.

Procedure
After you determine the structure size, update the CFRM policy with the new value and install the updated policy.
Chapter 8. Troubleshooting: Abend codes

Abend codes are issued by the data-gathering or trace components of IMS Buffer Pool Analyzer. The technical information in this section can help you troubleshoot and diagnose IMS Buffer Pool Analyzer problems.

The following abend codes can occur during execution of IMS Buffer Pool Analyzer:

**U4081**

User 4081 abends are issued by the data-gathering or trace components of IMS Buffer Pool Analyzer.

These abends occur only in the BPLTRACE started task and do not affect the job or IMS subsystem being monitored.

Messages written to the MVS SYSLOG before the abend indicate the reason for the abend.

**U4082**

User 4082 abends are issued by the reporting components of IMS Buffer Pool Analyzer. Messages indicating the reason for the abend are written to the print output.
Chapter 9. Troubleshooting: Error messages

This reference section provides detailed information about the error messages that are issued by IMS Buffer Pool Analyzer. The technical information in this section can help you troubleshoot and diagnose IMS Buffer Pool Analyzer problems.

IMS Buffer Pool Analyzer messages have the following format:

\[BPLnnnx\, text\]

Where:

- **BPL**
  - Indicates that the message was issued by IMS Buffer Pool Analyzer.
- **nnnx**
  - Is the message identification number.
  - Indicates the severity of the message as follows:
    - **A** indicates that operator intervention is required before processing can continue.
    - **E** indicates that the job step is about to terminate abnormally.
    - **I** indicates that the message is for information only.
    - **W** indicates that the message is a warning to alert you to a possible error condition.

**Message Variables**

In the message text, there can be lowercase variables (for example, \(xxx\...\)). The variables represent values when the message appears such as:

- Data in a data set
- A return code
- An error code

**Message Documentation**

In addition to message number and message text, information for each message includes the following:

- **Explanation:**
  - The Explanation section explains what the message text means, why it occurred, and what its variable entry fields are (if any).

- **System Action:**
  - The System Action section explains what the system will do next.

- **User Response:**
  - The User Response section describes whether a response is necessary, what the appropriate response is, and how the response will effect the system or program.

**BPL000I** modid debug information

**Explanation:** This is an informational debug message that can be written when \(OPT=DEBUG\) is specified in the BPLTRACE start command. \(modid\) is a four-character module ID indicating the module that issued the debug message. There are 26 variations of trace messages, which are of value when investigating a software problem with the data gathering process. For an IMS control region with many databases, the number of trace messages can be very large. Because these messages are written to MVS SYSLOG, it is recommended that you use the DEBUG option only as directed by the IBM Software Support.
**BPL101E • BPL108E**

**System action:** None.

**User response:** To disable debug messages, do not include the OPT=DEBUG parameter in the BPLTRACE start command or in the BPLTRACE PROC.

---

**BPL101E OPEN FAILED FOR IMSACB DD ddname**

**Explanation:** An attempt was made to open the IMS control region ACBLIB data set(s) that was allocated to ddname. The open was not successful.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Review the MVS SYSLOG for error messages associated with the open of the library. If no messages are found to indicate the cause of the problem, contact IBM Software Support for assistance.

---

**BPL102E ACBLIB BLDL FOR DBD MEMBERS FAILED RC=nn REASON=nn**

**Explanation:** A BLDL for members of the ACBLIB data set(s) was unsuccessful. The return code and reason codes from the BLDL macro are shown in the message text.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Review the MVS SYSLOG for error messages associated with the error. If no messages are found to indicate the cause of the problem, contact IBM Software Support for assistance.

---

**BPL103E BLDL FAILED ACBLIB MEMBER dbdname**

**Explanation:** The indicated DBD member of ACBLIB was not found.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Verify that an online change for the ACBLIB data sets was not in progress at the time of the error. Contact IBM Software Support for assistance.

---

**BPL104E INVALID ACBLIB DIRECTORY DATA FOR DBD dbdname**

**Explanation:** ACBLIB member, dbdname, did not contain valid PDS directory information for an IMS DBD member of ACBLIB.

**System action:** IMS Buffer Pool Analyzer ignores the database with the error and continues processing.

**User response:** Contact IBM Software Support for assistance.

---

**BPL105E ACBLIB MEMBER dbdname NOT FOUND**

**Explanation:** A FIND macro for ACBLIB member dbdname failed.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Review the MVS SYSLOG for error messages associated with the error. If no messages are found to indicate the cause of the problem, contact IBM Software Support for assistance.

---

**BPL106E DBD VALIDATION FAILED FOR ACBLIB MEMBER dbdname (r)**

**Explanation:** Validation of ACBLIB member dbdname failed. The reason for the failure is indicated by the reason code r at the end of the message.

**System action:** IMS Buffer Pool Analyzer ignores the database with the error and continues processing.

**User response:** Verify that the ACBLIB member named in the message is valid. Contact IBM Software Support for assistance.

---

**BPL107E ACBLIB MEMBER dbdname HAS NO DATA**

**Explanation:** No data was found while reading ACBLIB member dbdname.

**System action:** IMS Buffer Pool Analyzer ignores the database with the error and continues processing.

**User response:** Make sure that an online change was not in progress at the time of the error. Review the MVS SYSLOG for error messages associated with the error. If no messages are found to indicate the cause of the problem, contact IBM Software Support for assistance.

---

**BPL108E ACBLIB MEMBER dbdname HAS INCOMPLETE DATA**

**Explanation:** The ACBLIB member dbdname did not contain the entire DBD.

**System action:** IMS Buffer Pool Analyzer ignores the database with the error and continues processing.

**User response:** Ensure that an online change was not in progress at the time of the error. Review the MVS SYSLOG for error messages associated with the error. If no messages are found to indicate the cause of the problem, contact IBM Software Support for assistance.
BPL109E  INVALID PARAMETER INFORMATION PASSED TO BPLACBR

Explanation: The list of database names that should be provided to module BPLACBR was missing.
System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.
User response: Contact IBM Software Support for assistance.

BPL123E  CONCATENATED DATASET FOR DDN=ddname DBD=dbdname

Explanation: The TIOT in the target address space indicates that there are multiple data sets associated with the indicated ddname. Database dbdname should have only one data set allocated to the ddname, not a concatenation of data sets.
System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.
User response: Review allocation for the indicated ddname. Contact IBM Software Support for assistance.

BPL124I  JOBNAME name BEING TRACED HAS PSB psbname

Explanation: Trace data is being gathered for the indicated DL/I or DBB batch job. The name of the PSB being used is also shown.
System action: None.
User response: This is an informational message that requires no response.

BPL125E  NO DATABASE DATA SETS FOUND IN TARGET JOB

Explanation: A review of the DL/I or DBB batch job environment showed that there were no database data sets allocated to the job and that there would, therefore, be no database I/O activity to trace.
System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.
User response: Determine whether the batch job accesses the IMS database. If the batch job performs any IMS database activity, contact IBM Software Support for assistance.

BPL126E  ERROR LOCATING ALL DATABASE DIRECTORIES

Explanation: An error occurred processing the database directory information for a batch DL/I or DBB job.
System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

BPL127E  ERROR RETRIEVING PSB INFORMATION FOR JOB - xxxx

Explanation: Buffer Pool Analyzer encountered an unexpected condition while locating the PSB in use for a DL/I batch job.
System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.
User response: Verify that the DL/I batch job did not complete when the error occurred. The reason for the unexpected condition is indicated in the message text. Contact IBM Software Support for assistance.

BPL131E  LOAD FAILED FOR MODULE IGGCSI00 RC=nn ABEND=nnn

Explanation: The BPLTRACE task tried to load module IGGCSI00, the catalog search interface module. The load failed with the indicated abend code and return code.
System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.
User response: Verify that the catalog search interface module (IGGCSI00) is installed on the system and is available to the BPLTRACE started task.

BPL133E  CATALOG SEARCH INTERFACE RETURN CODE nn REASON CODE nnnnnn

Explanation: A catalog request made to the Catalog Search Interface failed with the indicated return code and reason code.
System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.
User response: The CSI return code and reason codes are documented in the DFSMS/MVS Managing Catalogs manual. Contact IBM Software Support for assistance.

BPL134E  CATALOG SEARCH INTERFACE DATA ERROR REASON CODE nnnnnnnn

Explanation: The CSICRETN field indicated a failure in the Catalog Search Interface module.
System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.
User response: The CSI return code and reason codes are documented in the DFSMS/MVS Managing Catalogs manual. Contact IBM Software Support for assistance.
BPL135E CATALOG SEARCH INTERFACE FIELD ERROR REASON CODE

Explanation: The CSIEFLAG field indicated a failure in the catalog search interface module for a field.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: The CSI return code and reason codes are documented in the DFSMS/MVS Managing Catalogs manual. Contact IBM Software Support for assistance.

BPL136E UNKNOWN CATALOG ENTRY TYPE RETURNED

Explanation: The CSIETYPE field returned by the Catalog Search Interface module contained an unknown entry type.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL137E CATALOG SEARCH (IGGCSI00) ERROR - reason

Explanation: The CSICFLAG field indicated a failure in the Catalog Search Interface module. The CSI return code and reason codes are documented in the DFSMS/MVS Managing Catalogs manual.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL138E UNEXPECTED CATALOG ENTRY TYPE FOUND - type

Explanation: The Catalog Search Interface module returned an unexpected data set type for a database data set.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL139E INCORRECT CATALOG ENTRY - DBD=dbdname DDN=ddname

Explanation: These messages follow the preceding BPL139E message:

BPL139E DSN=dataset-name
BPL139E RETURNED DSN=dataset-name

The catalog search interface module returned a data set name that was not the same as the data set name requested. The data set names requested and returned are shown in the messages that are issued.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: List the catalog entry for the requested DSN shown in the message to verify that it contains catalog information for the expected data set. Contact IBM Software Support for assistance.

BPL140E VSAM CATALOG INFO MISSING - DBD=dbdname DDN=ddname

Explanation: This message follows the preceding BPL140E message:

BPL140E DSN=dataset-name

The Catalog Search Interface did not return a value for the VSAMTYPE parameter.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: List the catalog entry for the requested DSN shown in the message to verify that it contains complete catalog information. Contact IBM Software Support for assistance.

BPL151E BPLDSNI PARM MISSING ADDRESS SPACE INDICATOR

Explanation: Required parameter information was not provided to module BPLDSNI.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL152E BPLDSNI PARM HAS TOO MANY ADDRESS SPACES

Explanation: Invalid parameter information was provided to module BPLDSNI.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL153E SETLOCK {OBTAIN | RELEASE} FAILED RC=nn

Explanation: An MVS SETLOCK request failed with the indicated return code. The type of SETLOCK request (OBTAIN or RELEASE) is shown in the message.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.
User response: Contact IBM Software Support for assistance.

BPL154E {GETMAIN | FREEMAIN} FOR ECSA FAILED RC=nn

Explanation: A GETMAIN or FREEMAIN macro, as shown in the message, failed. The return code from the GETMAIN/FREEMAIN macro is shown in the message.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL155E SRB ERROR IEAMSCHD RC=nn

COMP=nnn CODE=nnn REASON=nnn

(STATUS nnnnn)

Explanation: An IEAMSCHD macro failed with the indicated return code (register 15), SRBCOMP, SRB CODE, and SRB reason code fields. The SRBSTAT field contains program status information.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL156E IEAMSCHD FAILED RC=nn

Explanation: An IEAMSCHD macro failed with the indicated return code (register 15).

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL157E BPLSRB00 FAILED - SEE SYSLOG MESSAGE(S) (STATUS=nnnn)

Explanation: A failure occurred during dsname processing.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Check the MVS SYSLOG for other BPL messages preceding this message. Contact IBM Software Support for assistance.

BPL158E BPLSRB00 WAS SUCCESSFUL BUT NO DSNAMES WERE RETURNED (STATUS=nnnn)

Explanation: A failure occurred during dsname processing.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL159E DYNAMIC {ALLOCATION | CONCATENATION} FAILED RC=nn

ERROR CODE=nnnnn INFO CODE=nnnnn

Explanation: A failure occurred during dynamic allocation processing. The return code, error code, and information code are indicated in the message.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Review the reason for the dynamic allocation error. Contact IBM Software Support for assistance.

BPL171E DDNAME SEARCH FAILED - control-block ADDRESS WAS 0

Explanation: A failure occurred during dsname processing.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL172E SWAREQ FAILED FOR control-block RC=nn

Explanation: A SWAREQ macro failed for the named control block type. The return code is indicated in the message.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL173E ALESERV {ADD | DEL} FAILED RC=nn

Explanation: An ALESERV macro failed. The return code and type of request (add or delete) are indicated in the message.

System action: Buffer Pool Analyzer ends the
BPL181E • BPL186E

BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL181E GTF NOT ACTIVE OR NOT RECORDING E440 USER RECORDS

Explanation: A GTRACE macro indicated that GTF was not recording the appropriate user trace records required for Buffer Pool Analyzer.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL182E GTRACE ERROR - RETURN CODE nn

Explanation: A GTRACE macro failed with the indicated return code.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Verify that the GTF trace started by the BPLTRACE task was running at the time of the error. Contact IBM Software Support for assistance.

BPL183E UNABLE TO DETERMINE THE ACTIVE ACBLIB DD

Explanation: An error occurred determining the ddname of the active ACBLIB.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL184E UNABLE TO DETERMINE THE ACTIVE ACBLIB DATASET NAMES

Explanation: The IMSACBA or IMSACBB ddname was not found in the TIOT of the target address space.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL185E ERROR LOCATING VALID DBD NAMES

Explanation: The scan to find what DBDs were present in the IMS subsystem failed to find all the DBD entries.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL186E FATH PATH ERROR - control-block ADDRESS WAS 0

Explanation: There was a valid DEDB database found in the database directory, but either the ESCD or the first DMCB address was not present.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL187E FAILED TO FIND ALL {DEDB | HALDB) DATABASES

Explanation: The number of either Fast Path DEDB or HALDB partition databases was not the same as the number expected.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL188E FIND FAILED FOR ACTIVE DEPENDENT REGIONS

Explanation: During data gathering, the BPLTRACE task was unable to determine the ASIDs of the IMS dependent regions.

System action: Buffer Pool Analyzer ends the BPLTRACE task.

User response: Contact IBM Software Support for assistance.

BPL189I IMS CONFIGURATION STATUS:

resource COMPLETE

Explanation: Buffer Pool Analyzer has completed gathering information for the resource named in the message from the IMS configuration. The resource field indicates the status of the information gathering phase and will be one of the following: DBD NAME, ACBLIB, ALLOC DSN, DFSMDA, RECON, or CATALOG

System action: None.

User response: None. This message provides the status of Buffer Pool Analyzer’s information gathering phase. The Buffer Pool Analyzer trace can be stopped once this message appears with COLLECTION COMPLETE, and batch reports will still be able to produce valid buffer pool reports.

BPL201E OPEN FAILED FOR ddname

Explanation: An OPEN request for the indicated ddname failed.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.
**User response:** Review the MVS SYSLOG for error messages associated with the open of the library. If no messages are found to indicate the cause of the problem, contact IBM Software Support for assistance.

**BPL202E**  
**BLDL FAILED**  
**FAILED RC=nn**  
**REASON=nn**

**Explanation:** A BLDL request failed. The return code and reason code are shown in the message.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Review the MVS SYSLOG for error messages associated with the library. If no messages are found to indicate the cause of the problem, contact IBM Software Support for assistance.

**BPL203E**  
**DFSMDA MEMBER FOR DBD dbdname**  
**DOES NOT INCLUDE DDNAME ddname**

**Explanation:** The IMS dynamic allocation module for DBD `dbdname` did not include data set name information for the `ddname` shown. This `ddname` is one of the required `ddnames` for this database, and the `ddname` should have been found in the dynamic allocation module.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Review the named DFSMDA member, and contact IBM Software Support for assistance.

**BPL204E**  
**CLOSE ERROR - DDNAME ddname**

**Explanation:** A data set CLOSE request failed.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Review the MVS SYSLOG for error messages associated with the close of the DD name. If no messages are found to indicate the cause of the problem, contact IBM Software Support for assistance.

**BPL205E**  
**LOAD FAILED FOR DFSMDA MEMBER name ABEND=nn**  
**REASON=nn**

**Explanation:** A LOAD request failed for the module name indicated in the message. The abend code and reason code are shown in the message.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Review the MVS SYSLOG for error messages associated with the error. If no messages are found to indicate the cause of the problem, contact IBM Software Support for assistance.

**BPL206E**  
**INVALID DFSMDA MEMBER name rsn**

**Explanation:** An error occurred processing the named dynamic allocation module. The reason code (`rsn`) assists the IBM Software Support in determining the nature of the error.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Contact IBM Software Support for assistance.

**BPL231E**  
**ERROR PROCESSING FASTPATH RECON RECORDS (rsn)**

**Explanation:** An error occurred processing RECON records associated with a Fast Path database. The reason code (`rsn`) provides the IBM Software Support with additional information on the cause of the error.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Contact IBM Software Support for assistance. The problem probably occurred because a database defined in IMS as a Fast Path DEDB was defined in the RECON data set as a non-Fast Path database.

**BPL232E**  
**ERROR PROCESSING HALDB RECON RECORDS (rsn)**

**Explanation:** An error occurred processing RECON records associated with a HALDB database. The problem probably occurred because a database defined in IMS as a HALDB database was defined in the RECON data set as a non-HALDB database. The reason code (`rsn`) provides the IBM Software Support with additional information on the cause of the error.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Contact IBM Software Support for assistance.

**BPL241E**  
**UNABLE TO FIND 3 RECON DSNS FROM THE SAME SOURCE**

**Explanation:** The DBRC API requires that all three RECON data sets be available. Buffer Pool Analyzer was unable to verify that it had correctly found all three RECON data set names because some were present in the job’s JCL and others were found in the dynamic allocation library.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Ensure that the batch job or IMS control region JCL have either all three RECON data set names included or that they have no data set names in the JCL.
BPL242E • BPL251E

**BPL242E**  UNABLE TO FIND AT LEAST 2 RECON DATASETS

*Explanation:* Two or more RECON data sets must be allocated to the BPLTRACE task. However, two or more were not found. It was not possible to proceed with accessing the RECON data sets.

*System action:* Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

*User response:* Review other messages that might have occurred before this, such as those for dynamic allocation failures for RECON data sets. Contact IBM Software Support for assistance.

**BPL243E**  RESERVE FAILED RC=nn

*Explanation:* A RESERVE macro failed with the indicated return code.

*System action:* Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

*User response:* Contact IBM Software Support for assistance.

**BPL244E**  RECON CLOSE ERROR RC=nn ACBERRFLG=nn

*Explanation:* A CLOSE macro failed for a RECON data set with the indicated return code and ACB error flag values.

*System action:* Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

*User response:* Review any RECON error messages that might have contributed to a close failure. The ACB error flag might also provide information related to the failure.

**BPL245E**  UNABLE TO DETERMINE RECON VERSION (rsn)

*Explanation:* A failure occurred processing the RECON header records. Buffer Pool Analyzer was unable to determine the version of the RECONS.

*System action:* Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

*User response:* Review the output from a LIST.RECON STATUS command to determine the RECON release. Contact IBM Software Support for assistance.

**BPL246E**  VSAM MODCB (type) RC=nn R0=nnnn

*Explanation:* A VSAM MODCB macro failed with the indicated return code and register 0 values. The *(type)* value is an indication of the specific MODCB that was in progress.

*System action:* Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

*User response:* Review the output from a
LIST.RECON STATUS command to determine the RECON status. Contact IBM Software Support for assistance.

**BPL252E** OPEN FAILED FOR `ddname` RC=nn ACBERFLG=nn

**Explanation:** An OPEN macro failed for a RECON data set (allocated to the `ddname` shown) with the indicated return code and ACB error flag values.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Review any RECON error messages that might have contributed to an open failure. The ACB error flag might also provide information related to the failure.

**BPL253E** VSAM verb FAILED RC=nn RPLERRCD=nn

**Explanation:** A VSAM GET or POINT macro failed for a RECON data set with the indicated return code and RPL error code values.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Review any RECON error messages that might have contributed to the error. The RPL error code might also provide information related to the failure.

**BPL254E** RECON DSN MISMATCH (JCL/DFSMDA) FOR `ddname`

**Explanation:** The RECON data set name present in the IMS DBRC task or batch job's JCL for the indicated RECON data set does not agree with the data set name in the dynamic allocation member in the job's STEPLIB or IMSDALIB.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Review the RECON data set names that are present in the batch job or IMS DBRC task JCL, along with the dynamic allocation members in job's STEPLIB or IMSDALIB DD names for inconsistencies.

**BPL257E** ATTACHX FAILED FOR DBRC API ROUTINE RC=rc

**Explanation:** The MVS ATTACHX macro returned an unexpected return code when it was called to attach load module BPLRCN2.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Review the MVS SYSLOG for other errors associated with the ATTACH failure, as well as the return code from the MVS ATTACH macro. For further assistance, contact IBM Software Support.

**BPL258E** UNEXPECTED IMS RELEASE ID FOUND

**Explanation:** The IMS release in the trace directory contained an unexpected value.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Review the MVS SYSLOG for other BPL messages that may be related to this error. Also, ensure that the target job or IMS control region is running IMS version 7.1, 8.1, 9.1, or 10.1.

**BPL259E** modname FAILED ABEND=abcode

**Explanation:** Buffer Pool Analyzer's DBRC API processing routine failed with the indicated abend code.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Review the MVS SYSLOG for additional messages that describe the reason for the subtask failure.

**BPL261E** PARM FIELD CONTAINS AN UNKNOWN KEYWORD

**Explanation:** The PARM= field in the BPLTRACE PROC contained an unknown keyword.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Review the PROC and the values specified for the symbolic parameters to determine the cause of the error.

**BPL262E** IMSID `imsid` NOT FOUND ON THIS MVS SYSTEM

**Explanation:** The IMSID specified in the BPLTRACE startup was not found on this MVS image.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Ensure that BPLTRACE is running on the correct MVS LPAR, and verify that the proper IMSID was specified. If the IMS subsystem is expected to be started at a later time, use the delay time (DT=) or wait time (WT=) parameters to allow BPLTRACE to wait until the IMS subsystem is available.

**BPL263E** IMS RELEASE NOT SUPPORTED FOR `subsystem-name`

**Explanation:** The job or IMSID specified in the BPLTRACE start command was found, but the release of IMS being run is not supported.
**BPL264E • BPL272E**

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** The Buffer Pool Analyzer supports only IMS versions 7.1, 8.1, 9.1, and 10.1. Ensure that the subsystem which experienced the error is running at one of these IMS releases.

**BPL264E OPEN FAILED FOR REQUIRED DDNAME ddname**

**Explanation:** An MVS OPEN failed for the specified ddname.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Ensure that the ddname is specified properly in the JCL. For example, the SYSLIB DD must refer to a PDS. Review the MVS SYSLOG to determine if there are other error messages associated with the open failure.

**BPL265E GTF IS ALREADY ACTIVE - TRACE NOT INITIATED**

**Explanation:** A GTF trace is already active on this MVS image. Only one GTF trace can be active on an MVS LPAR.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Ensure that there are no GTF traces executing when the BPLTRACE task is started. Also, ensure that if multiple BPLTRACE tasks are active, only one task at a time attempts to activate the GTF.

**BPL266E START COMMAND FAILED RC=nnnn**

**Explanation:** An MCGRE macro issued to start the GTF trace address space failed with the indicated return code.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Ensure that BPLTRACE is running APF authorized. Contact IBM Software Support for assistance.

**BPL267E GTF TRACE INITIALIZATION FAILED-CHECK GTFPROC NAME FOR POSSIBLE ERRORS**

**Explanation:** BPLTRACE started the BPLGTF PROC, but the GTF trace was not successfully initialized.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Review the MVS SYSLOG to determine why the BPLGTF started task failed.

**BPL268E PARAMETER VALUE SPECIFIED FOR KEYWORD keyword IS TOO LONG**

**Explanation:** The value for the identified keyword exceeded the allowable length.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Review the BPLTRACE value for the identified keyword where specified in the PROC or on the start command. Ensure the value conforms to the required lengths.

**BPL269E PARAMETER VALUE SPECIFIED FOR keyword IS NOT A VALID NUMBER**

**Explanation:** The value for the identified keyword is not a numeric value.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Review the BPLTRACE value for the identified keyword where specified in the PROC or on the start command. Ensure that the value specified for the identified keyword is numeric.

**BPL270E GTFTIME PARAMETER IS INVALID OR MISSING**

**Explanation:** The value for the GTFTIME (or GT= PROC parameter) was either not specified or not valid.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Review the BPLTRACE value for the GT parameter where specified in the PROC or on the start command. Ensure that the value specified is a valid value.

**BPL271E PARAMETER KEYWORDS IMSID AND JOBNAME WERE BOTH SPECIFIED**

**Explanation:** Values were specified for both JOB= and IMSID= in the BPLTRACE started task.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Only one of these parameters can be specified in a given BPLTRACE started task.

**BPL272E PARAMETER DID NOT INCLUDE A VALUE FOR EITHER IMSID OR JOB**

**Explanation:** A value was not specified for either JOB= or IMSID= in the BPLTRACE started task.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** One of these parameters is required
for BPLTRACE to identify the target of the trace process.

**BPL273I** WAITING FOR IMS BATCH INITIALIZATION TO COMPLETE - PHASE x

**Explanation:** A batch job that was requested to be traced has not completed IMS initialization. BPLTRACE will wait and recheck the status of the batch job every 2.5 seconds. The phase indicated in the message might be 1 - indicating that the batch SCD has not been built, or 2 - indicating that the batch initialization has not completed.

**System action:** None.

**User response:** None.

**BPL274E** ERROR FINDING ASCB FOR GTF STARTED TASK

**Explanation:** Buffer Pool Analyzer failed to find the ASCB for the BPLGTF started task.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Contact IBM Software Support for assistance.

**BPL275E** IMS BATCH JOB jobname NOT FOUND

**Explanation:** The IMS DLI or DBB batch job named jobname was not found on this MVS system.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Ensure that the job is running on the correct MVS LPAR (the same LPAR as BPLTRACE) and that the job is a DLI or DBB job. BMP jobs use the IMS control region database buffer pools and, therefore, are not traced by their job name.

**BPL276E** FIND FAILED FOR BATCH SCD FOR JOB jobname

**Explanation:** Buffer Pool Analyzer failed to find the batch SCD for the identified jobname.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Contact IBM Support Center for assistance.

**BPL277E** ATTACHX FAILED FOR CONFIGURATION ROUTINE RC=nn

**Explanation:** An ATTACHX macro failed with the indicated return code.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**BPL278E** ALESERV type FAILED RC=nn

**Explanation:** An MVS ALESERV macro failed. The type of the ALESERV (ADD or DELETE) is identified in the message text, as is the return code from the ALESERV request.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Contact IBM Software Support for assistance.

**BPL279E** module FAILED ABEND=abcode

**Explanation:** The identified module name ended abnormally. The abend code is included in the message text.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and any BPLGTF task.

**User response:** If the abend is a user abend, other messages indicate the reason for the failure. For a system abend, review the z/OS MVS System Codes manual, and contact IBM Support Center.

**BPL280E** QEDIT {FREE | LIMIT} FAILED RC=nn

**Explanation:** An MVS QEDIT macro failed with the indicated return code. The request might have been a free CIB request or a limit request.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task.

**User response:** Contact IBM Software Support for assistance.

**BPL281E** UNEXPECTED POST

**Explanation:** The BPLTRACE task was posted, but Buffer Pool Analyzer was unable to determine the reason for the post.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task, and any BPLGTF trace task.

**User response:** Keep the abend dump, and contact IBM Support Center for assistance.

**BPL282E** Note: This is a two-part message. (Part 1) GTF TIME INTERVAL EXPIRED BEFORE CONFIGURATION DATA COLLECTION COMPLETED (Part 2) INCREASE GTF TRACE TIME AND RETRY

**Explanation:** The GTF trace timer interval expired.
before Buffer Pool Analyzer completed data gathering and tracing.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the BPLGTF task.

**User response:** Ensure that a reasonable GTF time (GT=) value was specified. While running, the F BPLTRACE,STATUS command can be used to obtain additional information about the status of the trace. Contact IBM Software Support if the configuration does not complete within a reasonable time.

---

**BPL283E** GTF NOT ACTIVE OR NOT RECORDING E440 USER RECORDS

**Explanation:** A GTRACE macro indicated that GTF was not recording the appropriate user trace records required for Buffer Pool Analyzer.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Contact IBM Software Support for assistance.

---

**BPL284E** GTRACE ERROR - RETURN CODE nn

**Explanation:** A GTRACE macro failed with the indicated return code.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Verify that the GTF trace which was started by the BPLTRACE task was running at the time of the error. Contact IBM Software Support for assistance.

---

**BPL285E** JOB xxxxxxx ENDED BEFORE TRACE INIT COMPLETE - TRACE STOPPED

**Explanation:** A batch job that was requested to be traced ended before the Buffer Pool Analyzer initialization process completed.

**System action:** Buffer Pool Analyzer stops the GTF trace and the Buffer Pool Analyzer trace address spaces.

**User response:** When selecting an IMS batch job to monitor, choose a batch job that will run for a longer time.

---

**BPL286E** SCD ADDRESS INVALID CODE reason

**Explanation:** Validation of the target IMS subsystem's SCD address failed.

**System action:** Buffer Pool Analyzer ends the GTF trace and the Buffer Pool Analyzer trace address spaces.

**User response:** Ensure that the target job or IMSID did not end while Buffer Pool Analyzer was initializing. Contact IBM Software Support for further assistance.

---

**BPL288I** NNNNNN CONFIG ENTRIES TRACED

**Explanation:** The BPLTRACE task traced the indicated number of IMS configuration records.

**System action:** None

**Programmer response:** None

---

**BPL289I** NNNNNN CONFIG ENTRIES WERE RETRIED

**Explanation:** The BPLTRACE task tried to trace the indicated number of configuration records again because GTF discarded the initial trace attempt.

**System action:** The indicated number of records were traced once more.

**Programmer response:** If records had to be traced again, consider increasing the buffer space with the BPLGTF task.

---

**BPL290I** REQUESTED DELAY COMPLETED (nnnn) MINUTES

**Explanation:** The delay time (DT=) value requested at BPLTRACE startup has completed.

**System action:** Buffer Pool Analyzer continues processing.

**User response:** None.

---

**BPL291I** IMS OSAMGTF TRACE OUTPUT ENABLED FOR jobname

**Explanation:** The IMS OSAM GTF trace was started for the identified batch job or IMS control region.

**System action:** Buffer Pool Analyzer continues processing.

**User response:** None.

---

**BPL292I** GTF SUCCESSFUL INITIALIZATION DETECTED

**Explanation:** Buffer Pool Analyzer confirmed that GTF successfully initialized.

**System action:** Buffer Pool Analyzer continues processing.

**User response:** None.

---

**BPL293I** GTF TRACE STOP COMMAND ISSUED

**Explanation:** Buffer Pool Analyzer issued the MVS STOP command to close the GTF address space.
**BPL294I • BPL303I**

**BPL294I**  
**IMOSAMGTF TRACE OUTPUT DISABLED FOR jobname**  
**Explanation:** The IMS OSAM GTF trace was stopped for the identified batch job or IMS control region.  
**System action:** Buffer Pool Analyzer continues processing.  
**User response:** None.

**BPL295I**  
**SUBSYSTEM jobname ENDED BEFORE TRACE INTERVAL EXPIRED**  
**Explanation:** The batch job or IMS control region being traced ended before the GTF timer interval (GT=) completed.  
**System action:** Buffer Pool Analyzer continues as though the GTF time (GT=) had completed.  
**User response:** None.

**BPL296I**  
**UNEXPECTED OPERATOR COMMUNICATION - type**  
**Explanation:** The BPLTRACE task received an unexpected post from the operator communication ECB. This could have been a mount command, STC communication, or some other communication request.  
**System action:** The request is ignored.  
**User response:** None.

**BPL297I**  
**STOP COMMAND ACKNOWLEDGED**  
**Explanation:** The operator issued a MODIFY BPLTRACE,STOP or a STOP BPLTRACE command.  
**System action:** Buffer Pool Analyzer initiates shutdown processing.  
**User response:** None.

**BPL298I**  
**Note: This is a two-part message. (Part 1) MODIFY PARAMETER MISSING OR INVALID (Part 2) VALID MODIFY PARAMETERS ARE STATUS, START, OR STOP**  
**Explanation:** An invalid MVS MODIFY command was issued. The message text shows the three valid parameters on a MODIFY command.  
**System action:** Buffer Pool Analyzer ignores the command.  
**User response:** Correct the command, and enter it again.

**BPL299I**  
**JOB jobname HAS ENDED OR CHANGED STEPS. TRACE STOPPED**  
**Explanation:** The batch job or IMS control region being traced ended before the GTF timer interval (GT=) completed.  
**System action:** Buffer Pool Analyzer continues as though the GTF time (GT=) had completed.  
**User response:** None.

**BPL300W**  
**DYNAMIC UNALLOC FAILED RC=xx ERROR CODE=xxxx INFO CODE=xxxx**  
**Explanation:** Dynamic unallocation of the SYSLIB DD failed with the indicated return code and dynamic allocation error and information codes.  
**System action:** The BPLTRACE task continues.  
**User response:** Should an enqueue conflict occur for the PARMLIB dataset between the BPLTRACE and BPLGTF tasks, cancel both tasks. Contact IBM Software Support for assistance.

**BPL301I**  
**IMS BUFFER POOL ANALYSIS OPTIONS IN EFFECT**  
**Explanation:** This indicates the beginning of messages that describe the option requested for this trace session. Messages BPL203I to BPL306I follow this message and describe the options selected. These messages are always issued during Buffer Pool Analyzer trace initialization.  
When the BPLTRACE task is started, Buffer Pool Analyzer writes these messages to the MVS SYSLOG to identify the values in use for this process.

**System action:** Buffer Pool Analyzer continues processing.  
**User response:** None.

**BPL302I**  
**job-type =name**  
**Explanation:** The type of IMS task to be monitored, along with the name, are shown in the message. The message will show either a type of JOBNAME or IMSID and the name of the job or IMS control region.  
**System action:** Buffer Pool Analyzer continues processing.  
**User response:** None.

**BPL303I**  
**DELAY TIME (MINUTES) =nnnn**  
**Explanation:** The amount of delay time selected (or defaulted to) on the START command is shown in the message.  
**System action:** Buffer Pool Analyzer continues processing.  
**User response:** None.
BPL304I  MAXIMUM WAIT TIME (MINUTES) =nnnn

Explanation:  The amount of wait time selected (or defaulted to) on the START command is shown in the message.

System action:  Buffer Pool Analyzer continues processing.

User response:  None.

BPL305I  GTF TRACE TIME (MINUTES) =nnnn

Explanation:  The amount of GTF trace time selected (or defaulted to) on the START command is shown in the message.

System action:  Buffer Pool Analyzer continues processing.

User response:  None.

BPL306I  GTF PROC NAME =taskname

Explanation:  The name of the GTF trace PROC is shown.  The value, typically BPLGTF, is shown as specified in the START command or defaulted to in the BPLTRACE PROC.

System action:  Buffer Pool Analyzer continues processing.

User response:  None.

BPL320E  BLKSIZE OF SYSLIB DD IS LESS THEN 240

Explanation:  The block size of the PARMLIB data set (SYSLIB DD) in the BPLTRACE PROCLIB is less than 240. The block size must be at least 240.

System action:  The trace task abends.

Programmer response:  Ensure that the PARMLIB data set has a RECFM of FB and that the block size is at least 240.

BPL321I  PARM FIELD PROCESSING IN PROGRESS

Explanation:  In response to a STATUS request, this message indicates that PARAM= field processing has not yet completed.

System action:  None.

User response:  None.

BPL322I  DELAY status

Explanation:  In response to a STATUS or START MODIFY command, this message provides the status of the delay. Possible status field information is one of the following:
- COMPLETED (which shows the requested delay time)
- IN PROGRESS (which shows the amount of delay time remaining)
- BYPASSED BY OPERATOR (which shows the original delay time)

System action:  None. The BYPASSED BY OPERATOR format of the message indicates that a MODIFY START command was entered and that the delay time was bypassed.

User response:  None.

BPL323I  TRACE REQUESTED FOR task

Explanation:  In response to a status command, this message shows either the IMSID (where task is IMS imsid) or jobname (where task is JOB jobname).

System action:  None.

User response:  None.

BPL324I  WAITING FOR JOB START - mmmm:ss OF nnnn MINUTES REMAINING

Explanation:  In response to a STATUS request, this message indicates the amount of time that Buffer Pool Analyzer will continue looking for the requested IMS subsystem.

System action:  None.

User response:  None.

BPL325I  BUILDING GTF CONTROL CARDS

Explanation:  In response to a STATUS request, this message indicates that GTF trace control cards are being built and written to the PARMLIB data set.

System action:  None.

User response:  None.

BPL326I  IMS OSAMGTF TRACE STATUS: status

Explanation:  In response to a STATUS request, this message indicates the status of the IMS OSAMGTF trace. It can be NOT STARTED, STARTED, or STOPPED.

System action:  None.

User response:  None.
**BPL327I**  
**GTF TRACE**  
*status*

**Explanation:** In response to a STATUS command, this message shows the status of the GTF trace. Status can be any of the following:
- COMPLETE
- BEING STOPPED
- START SUCCESSFUL
- PENDING START VALIDATION
- IN PROGRESS (includes total time and remaining time of the trace)

**System action:** None.

**User response:** None.

---

**BPL328I**  
**IMS CONFIGURATION STATUS:**  
*status*

**Explanation:** In response to a STATUS request, this message indicates the status of the configuration process. It can be NOT STARTED, COMPLETE, IN PROGRESS, or STARTED.

**System action:** None.

**User response:** None.

---

**BPL329I**  
**STATUS DISPLAY COMPLETE**

**Explanation:** In response to a STATUS request, this message appears at the end of all status messages to indicate that the status request is complete.

**System action:** None.

**User response:** None.

---

**BPL330I**  
**NOT IN A DELAY WAIT - START REQUEST IGNORED**

**Explanation:** In response to a START request, this message indicates that Buffer Pool Analyzer is not waiting for the delay time (DT=) value.

**System action:** The command is ignored.

**User response:** If the trace is not executing, verify that the target job name or IMSID is running on the same MVS LPAR on which BPLTRACE is running.

---

**BPL331I**  
**START REQUEST COMPLETE - REMAINING DELAY TIME BYPASSED**  
(*mmmm* OF *nnnn* MINUTES)

**Explanation:** In response to a START request, this message indicates:
- The amount of time that was bypassed
- That Buffer Pool Analyzer will begin searching for the requested job or IMSID

**System action:** Delay time is bypassed as requested.

**User response:** None.

---

**BPL351E**  
**ATTACHX FAILED FOR CATALOG**  
*SERVER RC=xx*

**Explanation:** An MVS ATTACH for module BPLCATS failed with the indicated return code.

**System action:** The BPLTRACE task ends abnormally.

**User response:** Review the return code from the ATTACH macro identified in the message to determine the reason for the failure. Contact IBM Software Support for additional assistance.

---

**BPL352E**  
**SUBLTACK BPLCATS FAILED**  
*ABEND=xxxxx*

**Explanation:** The BPLTRACE task determined that one of the catalog server tasks has abended with the indicated abend code.

**System action:** The BPLTRACE task ends abnormally.

**User response:** Review the MVS SYSLOG for additional messages that may indicate the reason for the failure. Contact IBM Software Support for additional assistance.

---

**BPL353E**  
**SUBLTACK BPLCATS TERMINATE REQUEST FAILED**

**Explanation:** The BPLTRACE task requested that the catalog server tasks end, but one or more tasks failed to end.

**System action:** The BPLTRACE task ends abnormally.

**User response:** Review the MVS SYSLOG for additional messages that may indicate the reason for the failure. Contact IBM Software Support for additional assistance.

---

**BPL361W**  
**DFSVSAMP INPUT HAS INCONSISTENT CFOSAM**  
*parameter*

**Explanation:** TA statement in the DFSVSAMP input data contained a CFNAMES statement that included an inconsistent value for one of the CFOSAM keyword parameters. The DFSVSAMP input should contain the same values for the structure name (STRNAME), directory ratio (DIRRATIO), and element ratio (ELERATIO). The value that was inconsistent is specified in the message text.

**System action:** The report job ends continues. The inconsistent value is ignored.

**User response:** Review the DFSVSAMP input statements to ensure that all subsystems contain consistent specifications of the CFOSAM parameters.
**BPL362E** CFOSAM KEYWORD MISSING VALUE FOR parameter

**Explanation:** A statement in the DFSVSAMP input data contained a CFNAMES statement that was missing the value for one of the CFOSAM keyword parameters. The CFOSAM keyword must specify a value for the structure name (STRNAME) field.

**System action:** Reporting continues with either the DFSVSAMP model environment or the actual environment.

**User response:** Review the DFSVSAMP input statements to ensure that all subsystems contain a value for the CFOSAM structure name parameter.

**BPL382E** IXCQUERY FAILED FOR OSAM STRNAME RC=rc REASON=reason

**Explanation:** The IXCQUERY macro returned with an unexpected return code while querying the OSAM structure name. The return code and reason code are indicated in the message text.

**System action:** Data gathering continues, but OSAM coupling facility information will not be available for reporting.

**User response:** Contact IBM Software Support for assistance.

**BPL383E** ERROR PROCESSING IXCQUERY RESULTS - code

**Explanation:** IMS Buffer Pool Analyzer encountered a problem interpreting the output of the IXCQUERY macro. The code indicates the reason for the error.

**System action:** Data gathering continues, but OSAM coupling facility information will not be available for reporting.

**User response:** Contact IBM Software Support for assistance.

**BPL384E** IXLCSP FAILED RC=rc REASON=reason

**Explanation:** The IXLCSP macro returned with an unexpected return code. The return code and reason code are indicated in the message text.

**System action:** Data gathering continues, but OSAM coupling facility information will not be available for reporting.

**User response:** Contact IBM Software Support for assistance.

**BPL401I** NO OSAM CACHED SUBPOOLS FOUND

**Explanation:** The osam cache analysis report process did not find any cached OSAM subpools either the actual traced environment or the DFSVSAMP modeled environment.

**System action:** Reporting continues with either the DFSVSAMP model environment or the actual environment.

**User response:** Ensure that DFSVSAMP or trace files contain the data desired for this execution of the osam cache analysis utility.

**BPL421W** MISSING CF CONFIGURATION INFO FOR type

**Explanation:** Trace data provided to the OSAM cache analysis utility did not include configuration information for either ELEMENTS or BUFFERS as specified in the message text.

**System action:** A default value is provided for the missing value and reporting continues.

**User response:** Review the messages in the MVS SYSLOG during the execution of the BPLTRACE process to see if any BPL381E, BPL382E, BPL383E, or BPL384E messages indicating that CF information may not have been included in the trace file(s).

**BPL423W** INCONSISTENT IMSPLEX DEFINITIONS IN TRACES-type

**Explanation:** Buffer Pool Analyzer gathers information related to IMSPLEX definitions during the data gathering process which is written to the trace files. Inconsistent definitions were found while comparing the values among all the trace files that were input to the OSAM cache analysis report job. The type of information that was inconsistent is indicated in the message text, which will specify one of the following.

<table>
<thead>
<tr>
<th>Message Text</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCK STR</td>
<td>Lock structure name</td>
</tr>
<tr>
<td>OSAM STR</td>
<td>OSAM structure name</td>
</tr>
<tr>
<td>VSAM STR</td>
<td>VSAM structure name</td>
</tr>
<tr>
<td>OSAM MSZ</td>
<td>OSAM structure maximum size</td>
</tr>
<tr>
<td>OSAM ASZ</td>
<td>OSAM structure actual size</td>
</tr>
<tr>
<td>VSAM MSZ</td>
<td>VSAM structure maximum size</td>
</tr>
<tr>
<td>VSAM ASZ</td>
<td>VSAM structure actual size</td>
</tr>
<tr>
<td>DIRRATIO</td>
<td>OSAM cache structure directory ratio</td>
</tr>
<tr>
<td>ELERATIO</td>
<td>OSAM cache structure element ratio</td>
</tr>
<tr>
<td>CACHEACT</td>
<td>OSAM caching active flag</td>
</tr>
<tr>
<td>CFNAME</td>
<td>Coupling facility name where the OSAM structure resides</td>
</tr>
</tbody>
</table>
Table 1. Information that was inconsistent will specify one of the following message text. (continued)

<table>
<thead>
<tr>
<th>Message Text</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td># DIR</td>
<td>Number of directory entries contained in the OSAM structure</td>
</tr>
<tr>
<td># ELEM</td>
<td>Number of element entries contained in the OSAM structure</td>
</tr>
<tr>
<td>STR OVHD</td>
<td>The size of the OSAM structure overhead included in the structure size</td>
</tr>
<tr>
<td>DIR SIZE</td>
<td>The size of a directory entry contained in the OSAM structure</td>
</tr>
</tbody>
</table>

**System action:** The inconsistent value is ignored.

**User response:** Ensure that the inconsistency is expected. This message could indicate that IMS systems in different data sharing groups were included in the same OSAM cache analysis report request.

Unless you plan to merge data sharing groups, including different groups in the same cache analysis is not desirable, as different data sharing groups use separate OSAM coupling facility cache structures.

**BPL521E** OPEN FAILED FOR DDNAME *ddname*

**Explanation:** Open failed for the indicated *ddname*.

**System action:** The report job ends abnormally.

**Programmer response:** Verify that the indicated *ddname* is included in the JCL for the report job, and review the job log for any messages related to the OPEN failure.

**BPL522E** GETDSAB FAILED RC=nn FOR DDNAME SYSIN

**Explanation:** An MVS GETDSAB macro failed for DDNAME SYSIN.

**System action:** The report job ends abnormally.

**Programmer response:** Verify that the SYSIN DDNAME is included in the JCL for the report job. Contact IBM Support Center for assistance.

**BPL523E** TIME REQUEST FAILED

**Explanation:** An MVS TIME macro failed.

**System action:** The report job ends with a condition code 12.

**Programmer response:** Contact IBM Software Support for assistance.

**BPL524E** INVALID VARY PERCENT - MUST BE 0 - 100

**Explanation:** A VARYPCT statement contains an invalid value. Permissible values for the VARYPCT statement are 0% to 100%.

**System action:** The report job ends with a condition code of 12.

**User response:** The VARYPCT statement preceding the message contains the error. Review the statement and specify a valid value for VARYPCT=.

**BPL525E** VALUE OF xxxxxxx MISSING OR INVALID - ABOVE STMT IGNORED

**Explanation:** A statement in the DFSVSAMP input data contained syntax that was not acceptable.

**System action:** The report job ends with a condition code of 12.

**Programmer response:** The statement preceding the message contains the error. Review the statement, and correct any errors. The value that caused the error is identified in the message text.

**BPL526E** HIPERSPACE BUFFERS INVALID FOR BUFSIZE < 4096

**Explanation:** A statement in the DFSVSAMP input data contained a hiperspace buffer (or HSOptional/HSRequired) specification for a subpool with a buffer size of less than 4096 bytes.

**System action:** The report job ends with a condition code of 12.

**Programmer response:** The statement preceding the message contains the error. Hiperspace buffers are allowed only for subpools with buffer sizes of 4096 bytes or more.

**BPL527E** SUBPOOL IS xxxxxxx - ABOVE STMT IGNORED

**Explanation:** A statement in the DFSVSAMP input data contained a subpool specification (either IOBF= or VSRBF= statement) that was either invalid or a duplicate of a prior subpool definition.

**System action:** The report job ends with a condition code of 12.

**Programmer response:** The statement preceding the message contains the error. Review the statement, and correct the error.
BPL528E  FIRST POOLID FOLLOWS FIRST VSRBF - ABOVE STMT IGNORED

Explanation: A statement in the DFSVSAMP input data contained a VSAM pool definition (POOLID= statement) that follows the first VSAM subpool definition (VSRBF= statement).

System action: The report job ends with a condition code of 12.

Programmer response: If multiple VSAM pools are to be defined in an environment, all subpools must be associated with a VSAM pool. A POOLID= statement must precede each set of subpool definitions (VSRBF= statements).

BPL529E  POOLID ABOVE IS x x x x x x x x - ABOVE STMT IGNORED

Explanation: A statement in the DFSVSAMP input data contained a VSAM pool definition (POOLID= statement) that either duplicates a prior pool name or exceeds the maximum number of VSAM pool definitions.

System action: The report job ends with a condition code of 12.

Programmer response: For "DUPLICATE" error conditions, name every VSAM POOLID differently. For "TOO MANY" error conditions, reduce the number of VSAM pools to a maximum of 15 (minus any RESVPOOL pool identifiers specified).

BPL530E  DATABASE x x x x x x HAS AN INVALID SUBPOOL SPECIFIED - xxxx

Explanation: A statement in the DFSVSAMP input data specified a DBD= requirement for the named database to use a buffer pool with the specified name. The pool name requested in the DBD= statement was not specified on any POOLID= statement.

System action: The report job ends with a condition code of 12.

Programmer response: Correct the DBD= statement so that it specifies a valid pool name.

BPL531W  SUBPOOL xxxx HAS NO DBD’S ASSIGNED VIA DBD= STATEMENTS

Explanation: A statement in the DFSVSAMP input data specified a VSAM pool or OSAM subpool but there were no databases defined to use the pool or subpool.

System action: Reports are produced, but the reporting job produces a return code of 4.

Programmer response: Consider removing the VSAM pool or OSAM subpool if there are no databases to be assigned to use the pool or subpool. If a database should be assigned to use the pool or subpool, ensure that a valid DBD= statement is present to assign the database to the appropriate buffer pool.

BPL532E  INVALID KEYWORD - STATEMENT IGNORED

Explanation: A statement in the SYSIN DD contained invalid syntax.

System action: The report job ends with a condition code of 12.

Programmer response: Verify that the SYSIN DD contains only valid statements. DSNRPT= and DBDRPT= are valid keywords that must be the first data in a statement.

BPL533E  MISSING OR INVALID VALUE SPECIFIED FOR x x x x x x STATEMENT ABOVE

Explanation: A statement in the SYSIN DD contained an invalid value.

System action: The report job ends with a condition code of 12.

Programmer response: Verify that the SYSIN DD contains only valid statements. DSNRPT= and DBDRPT= statements must specify a value of either YES or NO.

BPL534E  MISSING OR INVALID VALUE SPECIFIED FOR KEYWORD x x x x x x IN CHANGE STATEMENT ABOVE

Explanation: A CHANGE DBD statement either did not include the indicated keyword, or specified an invalid value for the keyword.

System action: The report job ends with a condition code of 12.

User response: Check the syntax of the CHANGE DBD statement preceding the message. Validate that the indicted keyword was specified and that the value for the keyword is a valid value.

BPL535E  KEYWORD name IN CHANGE STATEMENT ABOVE error

Explanation: A CHANGE DBD statement either did not include the indicated keyword, or specified an invalid value for the keyword.

System action: The report job ends with a condition code of 12.

User response: Check the syntax of the CHANGE DBD statement preceding the message. Validate that the indicted keyword was specified and that the value for the keyword is a valid value.
BPL536E  ABOVE BUFNO STATEMENT HAS INVALID BUFFER SIZE size

Explanation: A BUFNO statement included an invalid number of buffers within the specifications. The invalid value, or at least the first eight characters of the value, are included in the message text.

System action: The report job ends with a condition code of 12.

User response: Check the value indicated in the message. It is not a valid value for the type of BUFNO statement preceding this message.

BPL537E  NUMBER OF BUFFER SPECIFICATIONS EXCEEDS 45

Explanation: A BUFNO statement included more than 45 values. Buffer Pool Analyzer has a limit of 45 values that can be specified in a BUFNO statement.

System action: The report job ends with a condition code of 12.

User response: Reduce the number of specifications in the BUFNO statement to 45 or less.

BPL538E  DUPLICATE BUFFER SIZE SPECIFIED - size

Explanation: A BUFNO statement included the same value more than once. The number is indicated in the message.

System action: The report job ends with a condition code of 12.

User response: Eliminate the duplicate value(s) specified in the BUFNO statement that precedes this message.

BPL539E  ERROR PROCESSING ABOVE BUFNO STMT - reason

Explanation: An internal error occurred processing the preceding BUFNO statement.

System action: The report job ends with a condition code of 12.

User response: Ensure that no more than one BUFNO for the same pool type was specified in the SYSIN DD input. Contact IBM Software Support for assistance.

BPL540E  INVALID NUMBER OF BUFFERS IGNORED - reason

Explanation: A BUFNO statement included an entry in the list of values that was not acceptable. The "reason" in the message text indicates the cause of the error - either that there was an entry with a value of less than 3 or an entry with a value of more than 32768.

System action: The report job ends with a condition code of 12.

User response: Review the values of the entries in the flagged BUFNO statement, and ensure that there are no entries with a value of less than 3; and, for OSAM or VSAM, that there are no entries with a value more than 32768.

BPL541E  OPEN FAILED FOR DDNAME ddname

Explanation: Open failed for the indicated ddname.

System action: The report job ends abnormally.

Programmer response: Verify that the indicated ddname is included in the JCL for the report job, and review the job log for any messages related to the open failure.

BPL542E  BUFFER POOL ANALYZER TRACE RECORDS MISSING - xxxxxxxx

Explanation: The Buffer Pool Analyzer reporting job scanned the first trace data set and was unable to find one or more Buffer Pool Analyzer trace records. The record type included in the message (TRACEDIR, ASID, SUBPOOL, DDT, or TGT NAME) indicates the type of 440 trace record that was not found.

System action: The report job ends abnormally because the trace data is not usable.

Programmer response: Review the GTF trace configuration information defined in the BPLGTF PROC used for data gathering. Consider increasing the following values:

- BLOK=value
  Note that the amount of storage specified is obtained from ECSA.
- SIZE=value
  value can be specified only for z/OS systems at version 1.6 or higher.
- NCP=value

After the PROC values have been reviewed and adjusted, rerun a new trace and report. If the problem continues, contact IBM Support Center for assistance.

BPL543E  MULTIPLE JOBNAMES PRESENT IN GTF DATA - jobname1 AND jobname1

Explanation: OSAM GTF records include the job name of the IMS subsystem that generated the record. There were multiple job names present in the GTF trace.

System action: The report job ends abnormally.

Programmer response: Make sure that the report data for only one job name is included in the report.
**BPL544E**  •  **BPL563E**

---

**BPL544E  BPL GTF RECORD HAS INVALID DATASET TYPE**

**Explanation:** A user 440 GTF record, generated by the BPLTRACE task, has an invalid data set type.

**System action:** The report job ends abnormally.

**Programmer response:** Contact IBM Software Support for assistance.

---

**BPL545E  SWAREQ FAILED RC=nn**

**Explanation:** An MVS SWAREQ macro failed.

**System action:** The report job ends abnormally.

**Programmer response:** Contact IBM Software Support for assistance.

---

**BPL546E  GTF CONTROL RECORD VALIDATION FAILED - reason**

**Explanation:** The Buffer Pool Analyzer verification on GTF control record information indicated that there was a problem.

**System action:** The report job ends abnormally.

**Programmer response:**
- The *reason* can be:
  - An INVALID AID/FID, which indicates that the first record in the trace data set was not a control record.
  - NOT A USER TRACE, which indicates that user type GTF trace records were not included in the trace.
  - SYSIDS PRESENT, which indicates that GTF trace data sets were merged with IPCS trace facilities. GTF trace data sets cannot be merged before input to the reporting facility.

Contact IBM Software Support for assistance.

---

**BPL547E  UNKNOWN SUBTYPE GTF 440 RECORD IGNORED**

**Explanation:** A user 440 GTF record, generated by the BPLTRACE task, has an unknown record type indication.

**System action:** The report job ends abnormally.

**Programmer response:** Contact IBM Software Support for assistance.

---

**BPL548E  INCONSISTENT TIMEZONES FOUND IN GTF RECORD**

**Explanation:** GTF trace records contained more than one time zone offset.

**System action:** The report job ends abnormally.

**Programmer response:** Buffer Pool Analyzer uses time stamps to validate the consistency of GTF data. If the time zone offset was changed during a trace interval, the trace data cannot be used. Rerun the trace when the time zone on the LPAR will not be changed.

---

**BPL549E  ERROR PROCESSING SPLIT RECORD - CODE code**

**Explanation:** Buffer Pool Analyzer encountered an error merging records that GTF had split across blocks in the GTFC trace file.

**System action:** The report job ends abnormally.

**Programmer response:** Retain the dump, and contact IBM Software Support for assistance.

---

**BPL550E  NO TRACE DDNAMES FOUND**

**Explanation:** Buffer Pool Analyzer was unable to locate any TRACExxx DD statements in the report job JCL.

**System action:** The report job ends abnormally.

**Programmer response:** Review the report job JCL and ensure that at least one DD name beginning with TRACE is present.

---

**BPL561E  UNEXPECTED GTF RECORD TYPE PASSED TO OSAM PROCESSOR (type)**

**Explanation:** Buffer Pool Analyzer passed an incorrect record to the OSAM subroutine.

**System action:** The report job ends abnormally.

**Programmer response:** Contact IBM Software Support for assistance.

---

**BPL562E  NUMBER OF OSAM DDNAMES EXCEEDED 65,536**

**Explanation:** More than 65,536 ddnames were found in the GTF trace data sets. IMS Buffer Pool Analyzer has a limit of 65,536.

**System action:** The report job ends abnormally.

**Programmer response:** If more than one trace data set was included in execution of the report, make sure that the traces are from a single IMS subsystem. Contact IBM Software Support for assistance.

---

**BPL563E  INCONSISTENT type VALUE FOR DDN ddname**

**Explanation:** There was inconsistent information in the trace data set(s) for the type (BLKSIZE, BFRSIZE, or SUBPOOL) for the indicated ddname.

**System action:** The report job ends abnormally.

**Programmer response:** If more than one trace data set was included in execution of the report, ensure that the trace information is consistent in all traces. Contact IBM Software Support for assistance.

---
BPL565E OSAM GTF type DOES NOT MATCH
BPL GTF DATA OSAM=value1
BPL=value2

Explanation: There was inconsistent information in the trace data set(s) for the type (BLKSIZE, SUBPOOL, or DMB/DCB number) between the OSAM trace records and the Buffer Pool Analyzer trace records.

System action: The report job ends abnormally.

Programmer response: If more than one trace data set was included in execution of the report, make sure that the trace information is consistent in all traces. Contact IBM Software Support for assistance.

BPL568E NO VALID BUFFER SUBPOOLS WERE FOUND FOR xxxxxxx IN POOL xxxx

Explanation: The named database could not be assigned a subpool in the named OSAM buffer pool. This occurs only for OSAM pools specified in the DFSVSAMP input data set.

System action: Reporting continues. The database identified in the message is not reported in the modeled results.

Programmer response: Review the OSAM definitions specified for the named subpool. Make sure there is a subpool with buffers large enough to hold blocks from this DBD.

BPL569E DDNAME xxxxxxx DMB/DCB number FOUND IN OSAM GTF DATA HAD NO CORRESPONDING BPL DATA

Explanation: OSAM GTF trace records were found in the trace data set for the named DDNAME, but the Buffer Pool Analyzer GTF trace records did not identify that DDNAME as a valid IMS database DDNAME.

System action: The trace records for this DDNAME are reported, but the DBDNAME and DSNAME associated with this DDNAME will be blank.

Programmer response: Contact IBM Software Support for assistance.

BPL570E OSAM GTF DATA CONTAINS SUBPOOL xxxx SIZE nnnn NOT PRESENT IN BPL DATA

Explanation: OSAM GTF trace records were found in the trace data set that indicated an OSAM subpool with the indicated subpool name and size. Buffer Pool Analyzer GTF trace records did not identify this subpool.

System action: The trace records for this buffer pool are reported, but some information might not be valid.

Programmer response: Contact IBM Software Support for assistance.

BPL581E INVALID PRINT FUNCTION DD IDENTIFIER

Explanation: An error occurred writing a message to the print data set. The print function identifier was invalid.

System action: The report job ends abnormally.

User response: Contact IBM Software Support for assistance.

BPL582E PRINT OPEN REQUESTED WHEN ALREADY OPEN

Explanation: An error occurred opening the print data set. The print file was already open.

System action: The report job ends abnormally.

User response: Contact IBM Software Support for assistance.

BPL583E PRINT CLOSE REQUESTED WHEN NOT OPEN

Explanation: An error occurred closing the print data set. The print file was not open.

System action: The report job ends abnormally.

User response: Contact IBM Software Support for assistance.

BPL584E MESSAGE EXCEEDS 132 BYTES

Explanation: An error occurred writing a message to the print data set. The message length exceeded the maximum allowable value.

System action: The report job ends abnormally.

Programmer response: Contact IBM Software Support for assistance.

BPL585E PRINT REQUESTED BEFORE OPEN

Explanation: Buffer Pool Analyzer requested that a message be printed before the print file was opened.

System action: The report job ends abnormally.

User response: Contact IBM Software Support for assistance.

BPL586E INVALID PRINT FUNCTION REQUEST BYTE

Explanation: An error occurred writing a message to the print data set. The message request type was invalid.

System action: The report job ends abnormally.

Programmer response: Contact IBM Software Support for assistance.
BPL587E • BPL595I

BPL587E  OPEN FAILED FOR PRINT DDNAME  

| ddname |

**Explanation:** Open failed for the indicated *ddname*.
**System action:** None.
**Programmer response:** Verify that the indicated *ddname* is included in the JCL for the report job, and review the job log for any messages related to the open failure.

BPL588E  OUTPUT FOR DDNAME *ddname* 
DISCARDED-DD COULD NOT BE OPENED

**Explanation:** Output could not be written to the named DD because the DD failed to open.
**System action:** None.
**User response:** Verify that the indicated *ddname* is included in the JCL for the report job.

BPL589E  CLOSE FAILED FOR DDNAME *ddname* 

**Explanation:** An attempt to close the named DD failed with a return code 4.
**System action:** The report job ends abnormally.
**User response:** Review the batch job's job log for messages that may be related to the close failure.

BPL590E  TITLE TEXT EXCEEDS POSSIBLE LENGTH 

**Explanation:** A request to specify title text exceeded the maximum length for title text.
**System action:** The report job ends abnormally.
**User response:** Contact IBM Software Support for assistance.

BPL591E  ITKB REQUESTED BUT SOFTWARE NOT AVAILABLE 

**Explanation:** The IMS Tools Knowledge Base load modules were not present in the report job STEPLIB data sets.
**System action:** The report job completes successfully, but output is only written to SYSOUT, not to the IMS Tools Knowledge Base repository.
**User response:** Ensure that the IMS Tools Knowledge Base SHKTLOAD library is included in the report job's STEPLIB, or that the ITKBSRVR= specification in the PARM field is omitted or specified as blanks if you do not wish to use the IMS Tools Knowledge Base.

BPL592E  BLDL FAILED FOR ITKB MODULE 

| HKTXXLI RC=rc R0=reason |

**Explanation:** An MVS BLDL for IMS Tools Knowledge Base module HKTXXLI returned an unexpected return code and reason code. The return code and reason code are shown in the message text.
**System action:** The report job ends abnormally.
**User response:** Determine the reason for the BLDL failure, and correct the problem. Contact IBM Software Support for assistance.

BPL593E  ITKB function FAILED DD=*ddname* 

| RC=rc R0=reason |

**Explanation:** An IMS Tools Knowledge Base request failed. The function code will be INITIAL, OPEN, WRITE, CLOSE, or TERMINATE. The DD name associated with the request, and the function return code and reason code are listed in the message.
**System action:** The report job ends abnormally.
**User response:** Contact IBM Software Support for assistance.

BPL594I  ITKB SERVER NOT ACTIVE-ITKB REPORTING BYPASSED 

**Explanation:** The ITKBSRVR= specification in the PARM field of the report job was not found on the LPAR where the report job is executing.
**System action:** The report job completes successfully, but output is only written to SYSOUT, not to the IMS Tools Knowledge Base repository.
**User response:** Correct the IMS Tools Knowledge Base server name specified in the PARM field of the report job so that it specifies a server name that is active on the MVS LPAR where the report job executes.

BPL595I  BUFFER POOL ANALYZER PRODUCT NOT DEFINED TO ITKB - ITKB BYPASSED 

**Explanation:** The IMS Tools Knowledge Base repository was not properly initialized for the Buffer Pool Analyzer product.
**System action:** The report job completes successfully, but output is only written to SYSOUT, not to the IMS Tools Knowledge Base repository.
**User response:** Ensure that the installation procedures documented in the Customization chapter of this manual were followed properly. The BPLITKB job in the SBPLSAMP library performs the required IMS Tools Knowledge Base initialization.
**BPL596I**  ITKB REPORT ID id NOT DEFINED - ITKB REPORT BYPASSED

**Explanation:** The IMS Tools Knowledge Base repository definitions for the report ID specified were missing or set to discard output.

**System action:** The report job completes successfully, but output is only written to SYSOUT, not to the IMS Tools Knowledge Base repository.

**User response:** Ensure that the installation procedures documented in the Customization chapter of this manual were followed properly. The BPLITKB job in the SBPLSAMP library performs the required IMS Tools Knowledge Base initialization.

---

**BPL612I**  TRACE DATASET WRAPPED TRACE START TIME REFLECTS THE OLDEST GTF DATA IN THE DATASET

**Explanation:** The Buffer Pool Analyzer determined that the trace data set wrapped.

**System action:** None.

**Programmer response:** Try to make sure that the trace data set is allocated with enough space to hold the data generated.

---

**BPL613I**  SOME TRACE RECORDS ARE MISSING. PER SECOND INFORMATION WILL BE IMPACTED DEPENDING ON THE NUMBER OF MISSING TRACE RECORDS

**Explanation:** Buffer Pool Analyzer determined that GTF could not write records to the trace data set fast enough to match the number of trace records generated.

**System action:** None.

**Programmer response:** Review the "Customizing the sample started tasks" topic in this document, especially the performance options for the BPLGTF PROC. Specifically, consider increasing the NCP=, BLOK= and, if applicable, the SIZE= parameters. Note that the BLOK= parameter specifies the amount of ECSA that GTF will use; therefore, ensure that you consider the amount of available ECSA before changing this parameter.

---

**BPL621E**  UNEXPECTED GTF RECORD TYPE PASSED TO VSAM PROCESSOR (type)

**Explanation:** Buffer Pool Analyzer passed an incorrect record to the VSAM subroutine.

**System action:** The report job ends abnormally.

**Programmer response:** Contact IBM Software Support for assistance.

---

**BPL622E**  NUMBER OF VSAM DDNAMES EXCEEDED 65,536

**Explanation:** More than 65,536 VSAM component names were found in the GTF trace data sets. IMS Buffer Pool Analyzer has a limit of 65,536.

**System action:** The report job ends abnormally.

**Programmer response:** If more than one trace data set was included in the report job, make sure that the traces are from a single IMS subsystem. Contact IBM Software Support for assistance.

---

**BPL623E**  INCONSISTENT type VALUE FOR DSN dsname

**Explanation:** There was inconsistent type information in the trace data set(s) (BLKSIZE or CISIZE, BFRSIZE, or SUBPOOL) for the indicated DSNAME.

**System action:** The report job ends abnormally.

**Programmer response:** If more than one trace data set was included in the report job, make sure that the trace information is consistent in all traces. Contact IBM Software Support for assistance.

---

**BPL625E**  VSAM GTF type DOES NOT MATCH BPL GTF DATA VSAM=value1 BPL=value2

**Explanation:** There was inconsistent type information (VSAMTYPE, VSHRPOOL, VSAMCLST, or DMB/DCB number) in the trace data set(s) between the OSAM trace records and the Buffer Pool Analyzer trace records.

**System action:** The report job ends abnormally.

**Programmer response:** If more than one trace data set was included in the report job, make sure that the trace information is consistent in all traces. Contact IBM Software Support for assistance.

---

**BPL626E**  UNKNOWN DSN FOUND IN VSAM GTF RECORD – dsn

**Explanation:** A VSAM GTF trace record contained a data set name that was not included in a Buffer Pool Analyzer GTF trace record.

**System action:** Reporting continues, although this data set will be reported with a blank DBDNAME and DDNAME.

**Programmer response:** If more than one trace data set was included in the report job, make sure that the trace information is consistent in all traces. Contact IBM Software Support for assistance.

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**BPL627E • BPL652E**

**BPL627E** UNKNOWN SUBPOOL FOUND IN VSAM GTF RECORD – bufsize

**Explanation:** A VSAM GTF trace record contained a buffer size that was not included in a Buffer Pool Analyzer GTF trace record.

**System action:** Reporting continues. A buffer pool is created with the indicated buffer size.

**Programmer response:** If more than one trace data set was included in execution of the report, make sure that the trace information is consistent in all traces. Contact IBM Software Support for assistance.

**BPL628E** NO VALID BUFFER SUBPOOLS WERE FOUND FOR xxxxxxx IN POOL xxxx

**Explanation:** The named database could not be assigned a subpool in the named VSAM pool. This occurs only for VSAM pools specified in the DFSVSAMP input data set.

**System action:** Reporting continues. The database identified in the message is not reported in the modeled results.

**Programmer response:** Review the VSAM definitions specified for the named subpool. Make sure that there is a subpool with buffers large enough to hold blocks from this DBD. Also if one of the database data sets is a KSDS, make sure that both data and index subpools exist that are large enough to hold control intervals from data sets associated with this DBD.

**BPL641E** ERROR PROCESSING FASTPATH RECON RECORDS (code)

**Explanation:** An error occurred processing DEDB RECON records.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Contact IBM Software Support for assistance.

**BPL642E** ERROR PROCESSING HALDB RECON RECORDS (code)

**Explanation:** An error occurred processing HALDB RECON records.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Contact IBM Software Support for assistance.

**BPL643E** DBRC API FUNCTION function RC=rc REASON=reason

**Explanation:** A call to the IMS DBRC API failed. The function, return code, and reason code are shown in the message text.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Review the DBRC API return code and reason code in the IMS System Programming API Reference. Contact IBM Software Support for assistance.

**BPL644W** ERROR PROCESSING HALDB PARTITION ID FOR DBD dbdname

**Explanation:** An unknown partition ID was encountered in one of the data sets for the database name indicated in the message text.

**System action:** Buffer Pool Analyzer continues processing.

**User response:** Review the DBRC for the named database to ensure that all database data sets have a valid partition ID. Reports produced using this trace file may experience unexpected results.

**BPL651I** ABEND Saaa RCbb DDNAME SYSLIB

**Explanation:** An abend occurred processing the SYSLIB DD in the BPLTRACE process. The abend code (saaa) and return code (bb) document the reason for the abend.

**System action:** If the abend is a system abend 013 with return code 18, resulting from the BPLTRACE member not already being in the PARMLIB data set, IMS Buffer Pool Analyzer writes a new member. Otherwise, the BPLTRACE task abends.

**Programmer response:** Determine the reason for the abend and address the cause of the problem. If a space abend such as B37/D37/E37 abend occurs, then increase the size of the PARMLIB data set.

**BPL652E** COMPRESS FAILED - reason

**Explanation:** IMS Buffer Pool Analyzer encountered an error attempting to compress the SYSLIB DD. The reason for the error is shown in the message.

**System action:** The BPLTRACE task abends.

**Programmer response:** The error might be caused by one of the following reasons:
- ATTACH RETURN CODE mm
  Determine the reason for the ATTACH macro to have failed, and contact IBM Software Support for assistance.
- IEBCOPY RETURN CODE mm
Determine the reason for IECOPY to have failed, and contact IBM Software Support for assistance.

**BPL653E** UNABLE TO RECOVER - *reason*

**Explanation:** IMS Buffer Pool Analyzer encountered an error attempting to recover from an abend during SYSLIB DD processing. The reason for the error is shown in the message.

**System action:** The BPLTRACE task abends.

**User response:** The error might be caused by one of the following reasons:
- **IGNORE OPTION NOT AVAILABLE**
  The DCB Abend Exit cannot ignore the error. This might be caused by the error being encountered during close processing.
- **MULTIPLE ABENDS OCCURRED**
  More than one abend occurred processing the SYSLIB DD. IMS Buffer Pool Analyzer only attempts recovery from a single abend.
- **UNEXPECTED ABEND**
  An abend other than a system 013 return code 18 occurred. IMS Buffer Pool Analyzer does not recover from other abends.

Review the abend code and any other messages associated with the error that might appear in the MVS SYSLOG. Contact IBM Software Support for assistance.

**BPL661E** GTF NOT ACTIVE OR NOT RECORDING E440 USER RECORDS

**Explanation:** A GTRACE macro indicated that GTF was not recording the appropriate user trace records required for Buffer Pool Analyzer.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Contact IBM Software Support for assistance.

**BPL662E** GTRACE ERROR - RETURN CODE *nn*

**Explanation:** A GTRACE macro failed with the indicated return code.

**System action:** Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

**User response:** Verify that the GTF trace started by the BPLTRACE task was running at the time of the error. Contact IBM Software Support for assistance.

**BPL663E** UNEXPECTED CONDITION PROCESSING DEDB ACTIVITY *a*

**Explanation:** An error occurred processing a DEDB access. An unexpected condition occurred interpreting the DEDB buffer request and the activity required to meet the buffer request.

**System action:** Buffer Pool Analyzer writes this message and message BPL664E and ignores the DEDB buffer request.

**User response:** Retain the messages issued during the problem occurrence, and contact IBM Software Support for assistance.

**BPL664E** **name** TRACE FIELD ENDS WITH *value*

**Explanation:** An error occurred processing a DEDB access. An unexpected condition occurred interpreting the DEDB buffer request and the activity required to meet the buffer request. This message shows the EPSITTRAC or DMHRTRAC fields and the last 16 bytes of trace IDs present in those control blocks.

**System action:** Buffer Pool Analyzer writes this message and message BPL663E and ignores the DEDB buffer request.

**User response:** Retain the messages issued during the problem occurrence, and contact IBM Software Support for assistance.

**BPL681E** UNEXPECTED GTF RECORD TYPE PASSED TO DEDB PROCESSOR *type*

**Explanation:** Buffer Pool Analyzer passed an incorrect record to the DEDB subroutine.

**System action:** The job report ends abnormally.

**User response:** Contact IBM Software Support for assistance.

**BPL682E** NUMBER OF DEDB DD NAMES EXCEEDED 16,384

**Explanation:** More than 16,384 DEDB component names were found in the GTF trace data sets. Buffer Pool Analyzer has a limit of 16,384.

**System action:** The job report ends abnormally.

**User response:** If more than one trace data set was included in the report job, ensure that the traces are from a single IMS subsystem. Contact IBM Software Support for assistance.

**BPL683E** INCONSISTENT *type* VALUE FOR DSN *dsname*

**Explanation:** There was inconsistent *type* information (BLKSIZE or CISIZE, BFRSIZE, or SUBPOOL) in the trace data set(s) for the indicated DSNNAME.

**System action:** The job report ends abnormally.

**User response:** If more than one trace data set was included in the report job, ensure that the trace information is consistent in all traces. Contact IBM Software Support for assistance.
BPL685E  BPL705E

Software Support for assistance.

BPL685E VSAM GTF type DOES NOT MATCH
BPL GTF DATA VSAM=value1
BPL=value2

Explanation: There was inconsistent type information
(VSAMTYPE, VSHRPOOL, SVSAMCLST, or DMB/DCB
number) in the trace data set(s) between the OSAM
trace records and the Buffer Pool Analyzer trace
records.

System action: The job report ends abnormally.

User response: If more than one trace data set was
included in the report job, ensure that the trace
information is consistent in all traces. Contact IBM
Software Support for assistance.

BPL686E UNKNOWN DSN FOUND IN VSAM
GTF RECORD - dsn

Explanation: A VSAM GTF trace record contained a
data set name that was not included in a Buffer Pool
Analyzer GTF trace record.

System action: Reporting continues, although this
data set will be reported with a blank DBDNSM and
DDNAME.

User response: If more than one trace data set was
included in the report job, ensure that the trace
information is consistent in all traces. Contact IBM
Software Support for assistance.

BPL687E UNKNOWN SUBPOOL FOUND IN
VSAM GTF RECORD - bufsize

Explanation: A VSAM GTF trace record contained a
buffer size that was not included in a Buffer Pool
Analyzer GTF trace record.

System action: Reporting continues. A buffer pool is
created with the indicated buffer size.

User response: If more than one trace data set was
included in the report job, ensure that the trace
information is consistent in all traces. Contact IBM
Software Support for assistance.

BPL688E DBD/AREA ENTRY WAS NOT FOUND
FOR AREA name

Explanation: A DEDB area present in a DEDB GTF
record was not found in the list of DEDB areas found
in the IMS configuration.

System action: The job report ends abnormally.

User response: Contact IBM Software Support for
assistance.

BPL701E OPEN FAILED FOR DDNAME ddname

Explanation: The BPLTRACE task attempted to open
the stated DD name but the OPEN failed.

System action: Buffer Pool Analyzer ends the
BPLTRACE task and the trace process.

User response: Review the MVS SYSLOG for error
messages associated with the OPEN failure. Contact
IBM Software Support for assistance.

BPL702E BLDL FAILED FOR MODULE module

Explanation: A BLDL for the named module failed.

System action: Buffer Pool Analyzer ends the
BPLTRACE task and the trace process.

User response: The named module was not found in
the IMS control region STEPLIB/JOBLIB. Contact IBM
Software Support for assistance.

BPL703E LOAD FAILED FOR MODULE name
RC=rc ABCODE=abcde

Explanation: An MVS LOAD for the named module
failed. The return code and abend code are listed in the
message text.

System action: Buffer Pool Analyzer ends the
BPLTRACE task and the trace process.

User response: Review the MVS SYSLOG for
additional messages associated with the LOAD failure.
Contact IBM Software Support for assistance.

BPL704E FIND FAILED FOR MEMBER name
RC=rc

Explanation: An MVS FIND macro for the named
module failed with the indicated return code.

System action: Buffer Pool Analyzer ends the
BPLTRACE task and the trace process.

User response: Review the MVS SYSLOG for
additional messages associated with the FIND failure.
Contact IBM Software Support for assistance.

BPL705E UNEXPECTED EOF IN RESLIB
MEMBER DBFDEDB0 PROCESSING
CESD RECORDS

Explanation: While reading member DBFDEDB0 from
RESLIB, an MVS READ macro indicated that end-of-file
was encountered when end-of-file was not expected.

System action: Buffer Pool Analyzer ends the
BPLTRACE task and the trace process.

User response: Contact IBM Software Support for
assistance.
Chapter 9. Troubleshooting: Error messages

BPL706E  FAILED TO LOCATE CSECT name IN RESLIB MODULE DBFDEDB0

Explanation: Buffer Pool Analyzer failed to locate the named CSECT name within RESLIB load module DBFDEDB0.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL707E  POINT FAILED IN MEMBER name RC=rc

Explanation: An MVS POINT macro issued within the named member returned an unexpected return code.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL708E  UNEXPECTED EOF IN RESLIB MEMBER DBFDEDB0 PROCESSING RELOCATION RECORDS

Explanation: Buffer Pool Analyzer encountered an unexpected end-of-file condition while reading RESLIB member DBFDEDB0.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL709E  ERROR PROCESSING RESLIB MEMBER DBFDEDB0

Explanation: Buffer Pool Analyzer encountered an unexpected condition while processing RESLIB member DBFDEDB0.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL710E  ERROR PLANTING DEDB INTERCEPT CODE code

Explanation: Buffer Pool Analyzer encountered an error while planting the BPA intercept to create DEDB GTF records. An internal code is indicated in the message text.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL712E  DEDB INTERCEPT FAILURE FOR MODULE DBFSGAB0 CODE code

Explanation: Buffer Pool Analyzer encountered an error while planting the BPA intercept in module DBFSGAB0 to create DEDB GTF records. An internal code is indicated in the message text.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL713I  BUFFER POOL ANALYZER DEDB I/O INTERCEPTS status

System action: None.

User response: None.

BPL714E  UNABLE TO LOCATE MODULE DBFDEDB0 IN IMS CTL

Explanation: Buffer Pool Analyzer encountered an error trying to locate module DBFDEDB0 in the IMS control region.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.

BPL715E  CLOSE FAILED FOR DDNAME ddname

Explanation: An MVS CLOSE failed for the indicated DD name.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Review the MVS SYSLOG for any other errors that may be associated with the CLOSE failure. Contact IBM Software Support for assistance.

BPL721E  INTERCEPT DEACTIVATE FAILED FOR DBFSGAB0 CODE code

Explanation: Buffer Pool Analyzer failed to deactivate the intercept for IMS module DBFSGAB0.

System action: Buffer Pool Analyzer ends the BPLTRACE task and the trace process.

User response: Contact IBM Software Support for assistance.
BPL722E

BPL722E  INTERCEPT DEACTIVATE FAILED
FOR DBFSGAB2 CODE code

System action:  Buffer Pool Analyzer ends the
BPLTRACE task and the trace process.

User response:  Contact IBM Software Support for
assistance.
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