STROBE MVS

STROBE IMS Feature

Release 3.0

COMPUWARE®

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Summary of Changes

This section discusses the changes to the STROBE IMS Feature for STROBE MVS for Sysplex Release 3.0.

Changes to the STROBE IMS Feature

The STROBE IMS Feature for STROBE MVS for Sysplex Release 3.0 supports IMS Version 8.1.

Changes to this Manual

The technical content of this manual did not change for STROBE MVS for Sysplex Release 3.0.

Introduction

This manual describes measurement concepts applicable to and specific data made available by the STROBE Information Management System (IMS) Feature of the STROBE MVS Application Performance Measurement System. The STROBE IMS Feature augments functions provided by the basic STROBE system.

The STROBE Application Performance Measurement System and the STROBE IMS Feature are products designed for IBM MVS/ESA, IBM OS/390, and IBM z/OS systems. The STROBE IMS Feature is designed for use with the following IMS releases:

- IMS/VS program number 5665-332
- IMS/ESA V3R1 program numbers 5665-408 and 5665-409
- IMS/ESA V4R1 program numbers 5685-012 and 5685-013
- IMS ESA V5R1 program number 5695-176
- IMS ESA V6 program number 5655-158
- IMS ESA V7 program number 5655-B01
- IMS ESA V8R1 program number 5655-15800

How This Manual Is Organized

Chapter 1, “Overview” presents an overview of the STROBE IMS Feature and the IMS/ESA environment.

Chapter 2, “Using the STROBE IMS Feature” describes how to use STROBE with the STROBE IMS Feature to measure an IMS region.

Chapter 3, “The STROBE Performance Profile for Dependent Regions” explains how to interpret the STROBE Performance Profile reports from the measurement of an online application in a Message Processing region and from a batch DL/I application.

Chapter 4, “The STROBE Performance Profile for CICS/DBCTL Regions” explains how to interpret the STROBE Performance Profile reports from a CICS/DBCTL environment.

Chapter 5, “The STROBE Performance Profile for IMS Supervisory Regions” presents a sample STROBE Performance Profile from an IMS control region and a DL/I Separate Address Space (DLISAS).

How to Use This Manual

You should read Chapter 1, “Overview” and Chapter 2, “Using the STROBE IMS Feature” before you submit a measurement request. If you want to interpret a STROBE Performance Profile from an IMS Message Processing region (MPR) or a batch DL/I application, read Chapter 3, “The STROBE Performance Profile for Dependent Regions”. If you want to interpret a STROBE Performance Profile from a CICS/DBCTL environment, read Chapter 4, “The STROBE Performance Profile for CICS/DBCTL Regions”. If you want to interpret a STROBE Performance Profile from an IMS control region or DL/I Separate Address Space (DLISAS), read Chapter 5, “The STROBE Performance Profile for IMS Supervisory Regions”.

The STROBE Library

The STROBE base product manuals include:

- *STROBE MVS Concepts and Facilities*, document number CWSTGX3A

  STROBE MVS Concepts and Facilities explains how to decide which programs and online regions to measure, when to measure them, and how to interpret the reports in the STROBE Performance Profile.

- *STROBE MVS Messages,* document number CWSTXM3A

  STROBE MVS Messages lists all messages and abnormal termination (ABEND) codes, describes how to interpret them, and in many cases suggests a corrective action.

- *STROBE MVS System Programmer's Guide*, document number CWSTXI3A

  The *STROBE MVS System Programmer's Guide* explains how to install and maintain STROBE.

- *STROBE MVS User's Guide,* document number CWSTUX3A and the *STROBE MVS User's Guide with Advanced Session Management*, document number CWSTUA3A

  The *STROBE MVS User's Guide* explains how to use STROBE to measure application performance. The *STROBE MVS User's Guide with Advanced Session Management* explains how to use STROBE with the STROBE Advanced Session Management Feature to measure application performance. Users who have the STROBE Advanced Session Management Feature will use this manual rather than the *STROBE MVS User's Guide*.

- *STROBE MVS Application Performance Measurement System Quick Reference*

  The *STROBE MVS Application Performance Measurement System Quick Reference* is a convenient reference for how to use STROBE and for interpreting the STROBE Performance Profile.

STROBE Feature Manuals

These manuals describe the optional features of the STROBE MVS Application Performance Measurement System. Each manual describes measurement concepts applicable to and specific data made available by the feature.

- *STROBE MVS User's Guide with Advanced Session Management*, document number CWSTUA3A
- *STROBE ADABAS/NATURAL Feature*, document number CWSTUN3A
- *STROBE CA-IDMS Feature*, document number CWSTUR3A
- *STROBE CICS Feature*, document number CWSTUC3A
- *STROBE COOL:Gen Feature*, document number CWSTUG3A
- *STROBE CSP Feature*, document number CWSTUP3A
- *STROBE DB2 Feature,* document number CWSTUD3A
- *STROBE IMS Feature,* document number CWSTUI3A
- *STROBE Interface Feature*, document number CWSTUF3A
- *STROBE Java Feature,* document number CWSTUJ3A
- *STROBE MQSeries Feature,* document number CWSTUM3A
- *STROBE UNIX System Services Feature,* document number CWSTUU3A

Online Documentation

STROBE manuals are available in HTML, Adobe Acrobat PDF format, and IBM BookManager format, on CD-ROM and at Compuware's technical support Web site at http://frontline.compuware.com.

Online Help

STROBE products provide the following online information:

- STROBE/ISPF Online Tutorials, Option T from the STROBE/ISPF STROBE OPTIONS menu
- STROBE/ISPF Online Message Facility, Option M from the STROBE/ISPF STROBE OPTIONS menu

Other Compuware Application Performance Management Products

The following products and features work in conjunction with the STROBE MVS Application Performance Measurement System. These tools extend the benefits of application performance management (APM).

iSTROBE

iSTROBE enables you to view and analyze STROBE Performance Profile data on a workstation using a standard Web browser. Easy to install and easy to use, iSTROBE guides you through the performance analysis process and offers recommendations for improving performance. iSTROBE simplifies the performance analysis of applications that you measure with STROBE. For more information on iSTROBE, see the iSTROBE *Getting Started Guide*.

SQL Analysis Feature

The SQL Analysis Feature works in conjunction with STROBE and iSTROBE or APMpower to supply access path analyses and database and SQL coding recommendations for DB2 applications measured by STROBE. The SQL Analysis Feature pinpoints the most resource-consumptive static or dynamic SQL statements, explains why these statements might be inefficient, and provides recommendations to improve the performance of the DB2 application. For more information on the SQL Analysis Feature, see the *STROBE MVS User's Guide* or the *STROBE MVS User's Guide with Advanced Session Management*.

APMpower

The APMpower Application Performance Analysis System extends the benefits of STROBE to application developers who use workstations to develop, test, and maintain MVS applications. Developers employ the APMpower graphical user interface and advanced analytical aids to navigate the Performance Profile, analyze and improve application performance, and share performance knowledge across the IS organization. For more information about APMpower, see the APMpower documentation.

Compuware APM Technical Support

For North American customers, for technical support, please contact the Technical Support department by telephone at (800) 585-2802 or (617) 661-3020, by fax at (617) 498-4010, or by e-mail at strobe-sup@compuware.com.

To access online technical support, visit Compuware's FrontLine page on the World Wide Web at http://frontline.compuware.com and select the product "STROBE and APMpower."

For other international customers, please contact your local Compuware office or STROBE supplier.

Compuware APM Training

Compuware's Education Resources Group offers a range of training options for organizations that use STROBE, iSTROBE, and APMpower. To arrange Application Performance Management training, please contact Compuware at 1-800-835-3190 or visit Compuware's Education Resources Group at http://www.compuware.com/training

For other international customers, please contact your local Compuware office or STROBE supplier for a complete list of APM Training offerings.

Compuware APM Service Offerings

For North American customers, for information about current service offerings, please contact your local Compuware sales office or call Compuware Corporate Headquarters at 1-800-COMPUWARE (266-7892) or visit Compuware's APM Product page on the World Wide Web at http://www.compuware.com/products/strobe.

For other international customers, please contact your local Compuware office or STROBE supplier for a complete list of Services offerings.

APM Installation Assurance

The APM Installation Assurance service assists you in planning for, installing, customizing and using APM products. The service will help you maximize the value and benefits derived from the APM product family.

Consulting engineers work closely with your IT personnel to understand your operating environment and your organization's APM goals. The engineer will assist you in developing a customization and installation plan for STROBE, iSTROBE, and APMpower. The engineer will oversee the installation process and verify product readiness. The engineer will also help set up measurement request schedules, request groups, history records, AutoSTROBE measurement requests, and will verify the installation of the SQL Analysis Feature.

With APM Installation Assurance services, your organization can immediately maximize the value received from your investment in the APM product family. You will also benefit from a fully customized installation that will enhance the product functionality and increase the automation aspects of your APM initiatives.

Application Performance Management Consulting

The Application Performance Management (APM) Consulting services assist you in identifying and resolving specific performance problems in your OS/390 business-critical applications.

Using STROBE, iSTROBE, and APMpower, consulting engineers work closely with your IT personnel to measure an application's performance, identify performance improvement opportunities and make recommendations for implementing solutions.

With APM Consulting services, your organization cannot only resolve problems quickly and effectively, but also gain the skills necessary to prevent application performance degradation in the future.

Application Performance Assessment

The Application Performance Assessment (APA) service assists you in achieving a higher level of performance for your OS/390 business-critical applications.

Using STROBE, iSTROBE, and APMpower, consulting engineers work closely with your IT personnel to evaluate the efficiency of business-critical applications, identify opportunities for improving performance and document the potential savings that can result from implementing recommended solutions.

With APA services, you cannot only improve application performance quickly and effectively, but also gain the knowledge and skills necessary to implement and sustain a process-oriented application performance management (APM) program.

Chapter 1. Overview

STROBE is a product that determines where and how time is spent in online applications and batch processing programs. STROBE produces a collection of reports that help you determine how to revise applications to improve their performance.

The STROBE IMS Feature extends the functions of STROBE. With the STROBE IMS Feature, you can measure IMS DB- and DC-dependent regions and evaluate the performance of

- online DL/I (Data Language/One) applications that execute in Message Processing regions (MPRs), IMS Fast Path regions (IFPs), or Batch Message Processing regions (BMPs)
- batch DL/I applications (DLBs)
- DL/I applications that access IMS from a CICS/DBCTL environment (when the STROBE IMS Feature is used in conjunction with the STROBE CICS Feature)

You can also measure and evaluate the performance of IMS system modules in the

- control region (CTL)
- DL/I Separate Address Space (DLISAS)

This chapter describes the benefits of the STROBE IMS Feature, provides an overview of IMS/ESA, and introduces the STROBE Performance Profile for IMS regions.

Benefits of the STROBE IMS Feature

The STROBE IMS Feature obtains measurement information to produce the STROBE Performance Profile, a series of reports that

- show CPU activity and wait by load module and control section
- attribute CPU activity and wait to DL/I requests within application programs
- identify CPU activity in online DL/I applications by IMS transaction (for Message Processing regions) or by routing code (for Fast Path regions)

The STROBE IMS Feature lets you identify the DL/I application programs and transactions that most affect the performance of your IMS system. Additionally, you can determine which IMS system modules execute on behalf of those application programs and transactions. Using this information, you can decide how to

- streamline application code to request DL/I services more efficiently
- concentrate performance improvement efforts to reduce CPU activity and wait resulting from DL/I database service requests
- divide transactions across Message Processing and Fast Path regions
- distribute hardware resources more effectively

The STROBE IMS Feature identifies CPU activity in IMS system tasks within the Control and DL/I regions by dynamically assigning them pseudo-transaction names.

Overview of IMS/ESA

IMS applications execute in four types of regions, each geared to a specific set of application processing needs. These types are known as

- Message Processing regions (MPRs)
- Fast Path regions (IFPs)
- Batch Message Processing regions (BMPs)
- Batch, or Batch DL/I regions (DLBs)

MPRs, IFPs, and BMPs are IMS DC-dependent online regions that access an IMS online database. DLBs are stand-alone regions that access an IMS off-line database.

DL/I is the set of services that can be requested by applications to manipulate database (DB) data and to interact with data communications networks (DC). DL/I application programs communicate with IMS DC by requesting DL/I functions associated with an Input/Output Program Communication Block (I/O PCB) or alternate PCB.

DL/I services use two control blocks to enable application programs to communicate with a database without a pointer to the physical location of the data. Database Descriptors (DBDs) define the physical structure of the database. A database Program Communication Block (DB PCB) refers to a DBD and defines the segments to which the application is sensitive and the type of access the application is permitted. A Program Specification Block (PSB) is a collection of DC PCBs or I/O PCBs that can be assigned to an application.

Some DL/I functions commonly used with IMS/DC are

- GET UNIQUE (GU), to retrieve the first input message
- GET NEXT (GN), to retrieve subsequent input messages
- INSERT (ISRT), to send an output message

DL/I applications manipulate IMS database data by requesting DL/I functions with a Database Program Control Block (DB PCB). Some DL/I functions commonly used with IMS DB are

- GET UNIQUE (GU), to retrieve a database segment and establish positioning for further processing
- GET HOLD UNIQUE (GHU), to retrieve a database segment, position for further processing, and retain the segment for an update or delete
- GET NEXT (GN), to retrieve the next database segment
- GET HOLD NEXT (GHN), to retrieve the next database segment and hold it for an update or delete
- GET NEXT WITHIN PARENT (GNP), to retrieve the next database segment in the current hierarchy
- GET HOLD NEXT WITHIN PARENT (GHNP), to retrieve the next database segment in the current hierarchy and hold it for an update or delete
- REPLACE (REPL), to replace the currently held database segment
- INSERT (ISRT), to add a new database segment occurrence
- DELETE (DLET), to delete the currently held database segment and its dependents, if any

A DL/I call can contain one or more Segment Search Arguments (SSAs). SSAs allow DL/I applications to form specific arguments describing the database segments to search, and to define selection criteria for DL/I to use when it executes the service call. DL/I calls can be *qualified* or *unqualified*. A *qualified* call uses one or more SSAs to form a complete path to a segment. An *unqualified* call contains only a segment name and does not use SSAs.

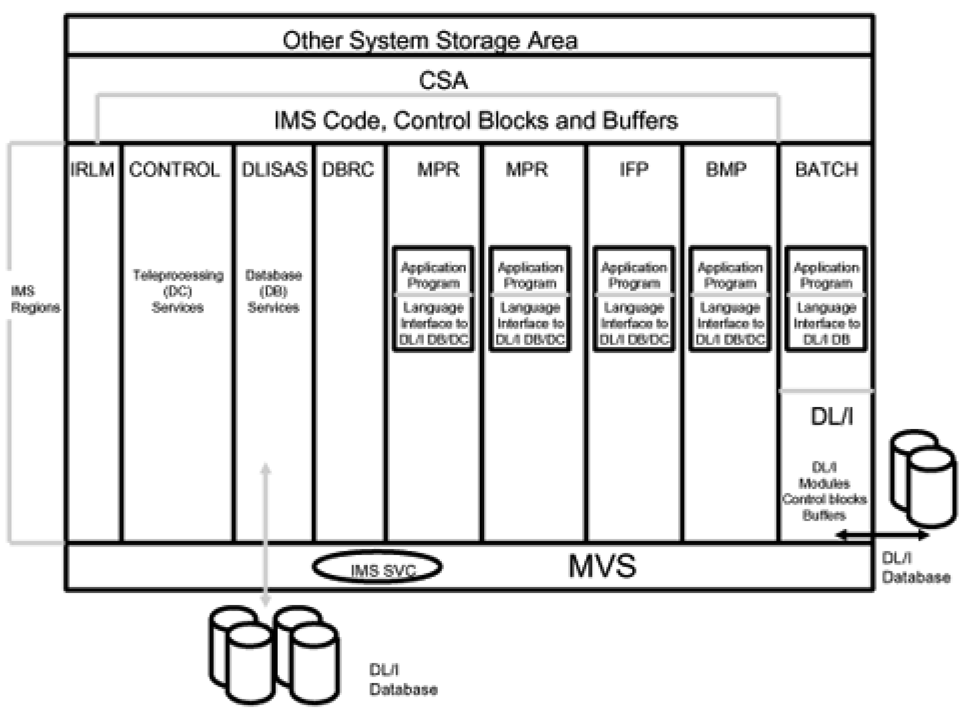
SSAs can also be qualified or unqualified. An unqualified SSA contains only the segment name. A qualified SSA defines which segment occurrence to access by using field names and values, relational operators, and command codes as qualifiers.

The IMS/ESA DB/DC Environment

IMS/ESA consists of two components, the Database Manager (DB) and the Transaction Manager (TM). The Database Manager allows you to create batch and database control (DBCTL) environments. The Transaction Manager allows you to create the data communication control (DCCTL) environment. Combining the Database and Transaction Managers produces the database/data communication (DB/DC) system, a multi-region environment with both system and application management facilities.

Figure 1-1 illustrates a hypothetical IMS DB/DC system. The figure shows the overall layout of regions composing the system and establishes the execution environment for DL/I applications. Brief descriptions of the region types are given below. For more information, see the IBM *IMS/ESA Administration Guide: System*.

Figure 1-1. Hypothetical IMS DB/DC System



IMS System Regions

This section describes the MVS address spaces known as IMS system regions: the control region, the Database Recovery Control (DBRC) address space, the DL/I Separate Address Space (DLISAS), and the internal resource lock manager (IRLM).

Control Region (CONTROL)	The control region anchors the entire IMS DB/DC system. It supervises message processing and communications with terminals, services DL/I calls, and manages restart, recovery, and the IMS system log.
Database Recovery Control (DBRC)	The control region automatically initiates the DBRC address space to help manage database availability, data sharing, and system logging for data integrity.
DLISAS	Specifying a Local Storage Option (LSO) of “S” causes the IMS control region to initiate the DLISAS, which contains DL/I code, control blocks, and buffers for full-function databases. IMS uses MVS cross-memory services to invoke DL/I to process application database calls.
internal resource lock manager (IRLM)	IRLM controls data sharing among dependent regions and other IMS systems. It is an optional IMS facility that protects database integrity by managing both local and global lock requests for multiple IMS systems, thus controlling access to resources that participate in data sharing. IRLM overrides Program Isolation (PI) locking, which controls local lock requests for single IMS systems. To activate the IRLM component, invoke a procedure from the master terminal with the MVS START command.

Dependent Regions

Dependent regions are MVS address spaces that are separate from, but functionally dependent on, the IMS control region.

In an IMS subsystem, the IMS control region performs all terminal control functions and schedules incoming transactions for processing in one or more dependent regions. To study the resource demands associated with a particular IMS transaction or function, you need to measure the dependent region that services the transaction or function.

Message Processing Regions (MPRs)	Message Processing applications allow interactive access to IMS online databases and message queues. IMS schedules these applications by associating each one with a transaction name and class. When a terminal input message with the transaction name associated with the application arrives in the control region, IMS DC schedules the application in an available Message Processing region (MPR) dedicated to processing its class. IMS starts the transaction, then gives control to the DL/I application program, which issues and services DL/I DB/DC requests. While the application has control of the MPR, STROBE identifies the transaction name and the module currently active or waiting. When the transaction completes, the MPR becomes available to process more transactions.

IMS Fast Path Regions (IFPs)	IMS schedules applications in Fast Path regions (IFPs) through routing codes, which are similar to the transaction names used with Message Processing regions (MPRs). IFP applications use database functionality that is not part of IMS full function (DL/I) database services, such as a Data Entry Database (DEDB) and a Main Storage Database (MSDB). When a terminal input message with a routing code arrives in the control region, IMS Fast Path schedules the application to execute in an available IFP region dedicated to processing the routing code. Once it starts, IMS Fast Path services satisfy any database service requests. While the application has control of the IFP region, STROBE identifies the routing code and the module currently active or waiting. When the application completes, the IFP region becomes available to process more Fast Path applications.
Batch Message Processing Regions (BMPs)	When a user submits a batch application, IMS schedules it to execute in Batch Message Processing regions (BMPs). A transaction name may trigger scheduling. Though applications that execute as BMPs are not interactive, they can access IMS online databases, message queues, and MVS data sets. While the application has control of the BMP, STROBE identifies the name of the module currently active or waiting. When the application completes, the BMP region terminates.

Batch Regions

Batch regions are IMS DB regions with no dependence on IMS DC. They start as submitted jobs that allocate all DL/I database data sets. No transaction or routing code is involved. The DL/I DBMS, which resides within the batch region, satisfies all DL/I service requests made by applications in the region. Batch applications are not interactive and do not access an IMS online database.

While the application has control of the batch region, STROBE identifies the name of the module currently active or waiting. When the application completes, the batch region terminates.

How Applications Communicate with IMS

DL/I application programs are loaded into and executed within IMS dependent and batch regions in the following manner:

1. The IMS control region handles all messages from terminals and application programs.
2. Application programs communicate with message queues and databases by issuing DL/I calls.
3. Programs request a DL/I service using the native program linkage facilities provided by the language in which the application is written.
4. When it calls DL/I, the program passes a parameter list containing an optional parameter count, a DL/I function, a Program Communication Block (PCB), the data area in the program for DL/I services to return data, and any SSAs containing database data selection criteria. For example, a COBOL DL/I call that supplies “DLI-FUNCTION” as the data-name for the DL/I function, “PCB-MASK” as the PCB, “I/O-AREA” as the return data area, and “SSA-AREA” as the data selection criteria has the following syntax:

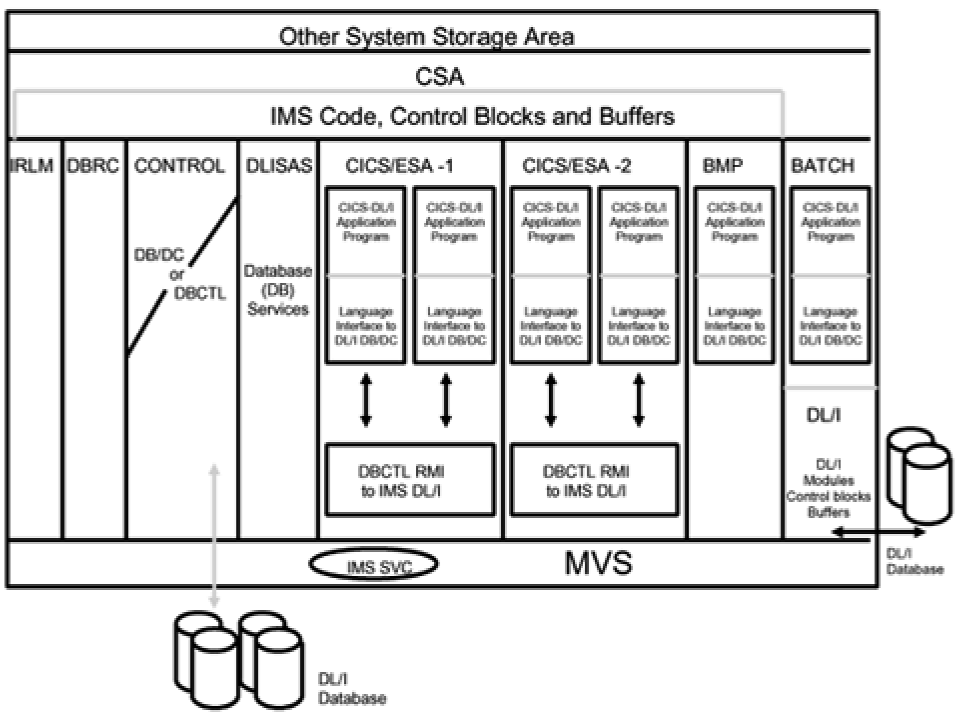
```
CALL 'CBLTDLI' USING DLI-FUNCTION,
          PCB-MASK,
          I/O-AREA,
          SSA-AREA.
```

5. When the application program call is issued, IMS invokes system service routines to examine the parameters, process requested functions, and return the results and control to the application program.

The CICS/DBCTL Environment

DL/I applications execute as CICS transactions within a CICS address space that is connected to an IMS system through the DBCTL interface. Figure 1-2 shows the layout of the region in a hypothetical CICS/DBCTL system and how it establishes the execution environment for DL/I applications. The batch, IRLM, DBRC, and DLISAS regions are the same as those in a IMS DB/DC environment.

Figure 1-2. Hypothetical CICS/DBCTL System



CICS/ESA Regions

CICS/ESA regions contain the CICS system service modules, application code, and the DBCTL Resource Manager Interface (RMI).

DBCTL Thread Tasks	When CICS is connected to IMS DBCTL, MVS tasks are created to service DL/I requests made by CICS transactions. These MVS tasks are called DBCTL threads, and each represents a path to IMS. The CICS/DBCTL Resource Manager Interface assigns a DL/I request to an available thread task for execution.
IMS System Regions	The control, IRLM, DBRC, and DLISAS regions are the same as those in a IMS DB/DC environment.

How DL/I Applications Execute in CICS/DBCTL Environments

When a DL/I application running in a CICS/DBCTL environment issues an EXEC DLI call or a CALLDLI command, the following occurs:

1. CICS receives the request and determines that a DL/I service is being requested.
2. ICS assigns the DL/I request to an available DBCTL thread task for execution.
3. IMS service routines residing in the IMS system regions service the DL/I request.
4. Upon completion, the thread task returns control to CICS, which returns control and the results to the application.

Overview of the STROBE Performance Profile for IMS/ESA

The STROBE Performance Profile for an IMS region contains all the reports described in *STROBE MVS Concepts and Facilities*. If you are measuring a CICS/DBCTL region, your STROBE Performance Profile also contains the CICS Performance Supplement, described in the STROBE *STROBE CICS Feature*.

Note: The Profiles for measurements of BMPs and DLBs do not contain the Transaction Summary and the Transaction Usage by Control Section, as these regions are not transaction oriented.

The STROBE IMS Feature adds IMS-specific information to the standard STROBE Performance Profile by identifying modules and transactions, and by tailoring the Attribution of CPU Execution and Attribution of CPU Wait Time reports, as described below.

Region Identifiers

The STROBE IMS Feature identifies the measured region type with the following three-character abbreviations in the Measurement Session Data report:

Abbreviation	Region Type
BMP	Batch Message Processing Region
CTL	Control Region
DBC	CICS Region connected to IMS DBCTL
DLB	Batch DL/I Region
DLS	DL/I Separate Address Space
DRC	Database Recovery Control Region
IFP	IMS Fast Path Region
MPR	Message Processing Region

The SUBSYSTEM field also shows the Local Storage Option (LSO) for the region, which controls the placement of DL/I modules, control blocks, and buffers in your IMS system. The identified LSO options are

Option	DL/I resides in	Access by dependent region is
N	MVS Common Storage (CSA, ECSA)	Direct
S	Separate address space	Via cross-memory services
X	IMS control region private storage	Via cross-memory services
Y	IMS control region private storage	Via WAIT/POST interface

Module and Transaction Identification in an IMS DB/DC Environment

The following subsections describe how STROBE identifies modules and transactions in an IMS DB/DC environment.

Load Module Identification

The STROBE IMS Feature assigns activity and wait within IMS system modules to two pseudo-sections within the pseudo-module .SYSTEM, namely .IMS for activity in load modules beginning with DFS or DBF, and .IRLM for activity in load modules beginning with DXR. The true module name appears as a procedure within .IMS or .IRLM. The STROBE IMS Feature also provides function descriptors for the IMS system modules.

To obtain detailed reporting by offset within an IMS system module, specify its name with the DETAIL parameter when you create the STROBE Performance Profile. For a detailed explanation of reporting options, see the *STROBE MVS User's Guide*.

Transaction Identification for IMS Dependent Regions

STROBE identifies CPU activity and wait in IMS regions that execute DL/I applications by using transaction names and routing codes defined to the IMSGEN through the TRANSACT and RTCODE macros.

Transaction Identification for IMS System Regions

The STROBE IMS Feature uses a STROBE-generated pseudo-transaction name to identify activity and wait in IMS system tasks in the control and DL/I regions. The STROBE IMS Feature dynamically creates a pseudo-transaction name based upon

- the function of the IMS task
- the active IMS system module within the task

The pseudo-transaction is composed of two elements, separated by a slash (/)

1. A three-character IMS task functional identifier
2. Characters four through seven from the name of the active IMS system module.

The task identifier implies the nature of the service the task provides to the IMS Control or DL/I region. Because many IMS modules may participate in the execution of a given IMS task, there is a wide variety of IMS pseudo-transactions.

Common three-character functional identifiers for the IMS tasks that appear in pseudo-transaction names created by the STROBE IMS Feature are

IMS Task	Name
CTL	DC Control Task (control region services)
DLI	DB Control Task (DL/I region services)
DBR	Database Recovery Task
DRC	DBRC Task
DYA	Dynamic Allocation Task
IFP	Fast Path Task
LOG	Log Control Task
RDS	Restart Data Set Services Task
RST	Restart Task (restart/checkpoint services)
STM	Storage Manager Task (storage compression)
TCO	Timer Control Task

Module and Transaction Identification in a CICS/DBCTL Environment

The STROBE CICS Feature identifies all CICS system and application modules.

For CICS/DBCTL transactions, STROBE describes observed DBCTL thread activity by using the four-character CICS transaction code associated with the DL/I application.

Other Pseudo-Names

If STROBE or the STROBE IMS Feature cannot identify an active IMS or MVS module, STROBE assigns activity related to the module to a pseudo-section name chosen according to the virtual storage location of the activity within the measured address space. For more information on pseudo-names, see *STROBE MVS Concepts and Facilities*.

The DL/I Request CPU Time and Wait Reports

DL/I system service modules are executing or waiting whenever an application program has issued a DL/I service request. Similarly, in a CICS environment, the DBCTL Resource Manager Interface and DL/I system service modules are executing or waiting whenever an application program within a CICS transaction has issued a DL/I service request.

The STROBE DL/I Request reports allow the application programmer and the database administrator to use the STROBE Performance Profile reports to identify not only the DL/I service call, but also the components of the DL/I parameter list. This parameter list contains data from the application program and supplies information about the call.

DL/I CPU and Wait Summary Reports

The DL/I CPU and Wait Summary reports identify the total CPU or wait time by the transaction, module, section, and PSB name that initiated the DL/I activity.

The DL/I CPU Summary report summarizes all observed DL/I processing by transaction, module, section, and PSB name.

The DL/I Wait Summary report summarizes all observed DL/I wait by transaction, module, section, and PSB name.

In both reports

- **Transaction** identifies a transaction.
- **Module** identifies a module that issued the DL/I call.
- **Section** identifies a control section that issued the DL/I call.
- **PSB** identifies the Program Specification Block (PSB).
- **Solo CPU or Wait Time Percent** reports the percentage of time spent executing or waiting on the given DL/I request, without any concurrent I/O activity.
- **Total CPU or Wait Time Percent** reports the percentage of time spent executing or waiting on the given DL/I request, with or without any concurrent I/O activity.
- **Histogram for CPU or Wait Time Percent** graphically displays the percentage of time spent executing or waiting on the given DL/I request. Solo time is indicated by the asterisk "*". The remaining overlapped time is indicated by the plus-sign "+".
- The last line presents total solo and total time for the transaction, module, section, and PSB.

When DL/I application programs are not active, STROBE assigns CPU and wait time to IMS system modules. For example, IMS system modules DFSPCC20 and DFSISI00 support region initialization and termination. Since no application programs can be active during these procedures, STROBE assigns the CPU and wait activity to the IMS system module that invoked DFSPCC20 or DFSISI00.

Figure 1-3 shows a sample DL/I CPU Summary report. Figure 1-4 shows a sample DL/I Wait Summary report.

Figure 1-3. Sample DL/I CPU Summary Report

```
                                                   ** DL/I CPU SUMMARY **

                                                       CPU TIME PERCENT       CPU TIME HISTOGRAM  MARGIN OF ERROR:  3.34%
TRANSACTION  MODULE      SECTION     PSB                SOLO     TOTAL       .00      14.50      29.00      43.50      58.00

STRID110     STRIC110    STRIC110    STRIC110          56.28     56.98       .*************************************+
STRID120     STRIC120    STRIC120    STRIC120            .47       .58       .
STRID130     STRIC130    STRIC130    STRIC130           2.33      2.33       .*
STRIM120     STRIL120    STRIL120    STRIL120            .35       .35       .
                                                       -----     -----
TOTAL CPU ACTIVITY                                     59.42     60.23
```

Figure 1-4. Sample DL/I Wait Summary Report

```
                                                  ** DL/I WAIT SUMMARY **


                                                       RUN TIME PERCENT       RUN TIME HISTOGRAM  MARGIN OF ERROR:  3.34%
TRANSACTION  MODULE      SECTION     PSB                PAGE     TOTAL       .00       2.50       5.00       7.50      10.00

STRID110     STRIC110    STRIC110    STRIC110            .00      1.03       .++++
STRID120     STRIC120    STRIC120    STRIC120            .00      4.01       .++++++++++++++++
STRID130     STRIC130    STRIC130    STRIC130            .00      8.46       .+++++++++++++++++++++++++++++++++
STRIM110     STRIL110    STRIL110    STRIL110            .00       .54       .++
STRIM120     STRIL120    STRIL120    STRIL120            .00       .45       .+
STRIM130     STRIL130    STRIL130    STRIL130            .00       .38       .+
                                                       -----     -----
TOTAL WAIT ACTIVITY                                      .00     14.86
```

CPU Usage and Wait by DL/I Request

The CPU Usage and Wait by DL/I Request reports show the IMS activity that can be directly attributed to a DL/I call statement within a transaction, module, section, and PSB name.

The CPU Usage by DL/I Request report (Figure 1-5 on page 1-12) presents a detailed listing of all identified DL/I activity by DL/I call statement.

The Wait by DL/I Request report (Figure 1-6 on page 1-12) presents a detailed listing of all identified DL/I wait by DL/I call statement.

The first four lines identify the transaction, module, section, and PSB name where the DL/I requests reside. In the Call Parameters section, each DL/I request has one or more lines containing the following:

- **Reference Number** refers to one or more DL/I request detail lines in the bottom half of the report.
- **PCB Type** identifies the Program Communication Block (PCB) being used as either I/O, DATABASE (DB), or ALTERNATE (ALT).
- **PCB Name or Label** identifies the PCB referenced in the DL/I service request.
- **Resource Name** identifies an IMS resource used to execute the DL/I function. For DATABASE PCBs, the resource is the Data Base Description (DBD) name. For ALTERNATE PCBs the resource is "MODIFY" (for a modifiable alternate PCB), the fixed destination name (for a non-modifiable alternate PCB), or blank (for I/O PCBs).
- **SSA Data** (Segment Search Argument Data) names the database segments to process, and defines the selection criteria DL/I uses for the call. The SSA consists of the segment name, optionally followed by a command code, field name specification, relational operator, and a question mark to indicate the presence of variable data. Note that the SSA context does not show extraneous null command codes and shows the SSA only up to the first key field value, represented by '????'.

The Function Activity section of the report provides one or more detail lines for each of the DL/I requests shown in the Call Parameters section. Each detail line consists of the following:

- **Line No.** identifies the DL/I request source line number within the application program.
- **Procedure Name** identifies the DL/I request within the application program.
- **Request Location** identifies, by hexadecimal offset, the DL/I request location within the application program.
- **Function Code** identifies the DL/I service being requested.
- **Reference Number** refers to a specific DL/I request in the upper half of the report.
- **Solo CPU or Page Wait Time Percent** reports the percentage of time spent executing or waiting on the given DL/I request, without any concurrent I/O activity. For wait time, page wait results from retrieving a page from a page data set.
- **Total CPU or Wait Time Percent** reports the percentage of time spent executing or waiting on the given DL/I request, with or without any concurrent I/O activity. For wait time, the time includes page retrieval.
- **Histogram for CPU or Wait Time Percent** displays the percentage of time spent executing or waiting on the given DL/I request. Solo time is indicated by the asterisk "*". The remaining overlapped time is indicated by the plus-sign "+".
- The last line gives total solo and total time for the transaction, module, section, and PSB name.

Figure 1-5. Sample CPU Usage by DL/I Request Report

```
                                                 ** CPU USAGE BY DL/I REQUEST **

TRANSACTION - STRID110
MODULE      - STRIC110
SECTION     - STRIC110
PSB         - STRIC110
                                                      CALL PARAMETERS

    REF      PCB   PCB NAME   RESOURCE
    NUMBER   TYPE  OR LABEL   NAME          SSA DATA

    000001   I/O   IOPCB
    000002   DB    LON00001   STRIDLON      CUSTROOT*D(CUSACTNO =????
                                            LOANSEGM*-(LOANNO   =????
    000003   DB    CUS00001   STRIDCUS
    000004   I/O   IOPCB
    000005   DB    CUS00001   STRIDCUS      CUSTROOT*PD(CUSACTNO =????
                                            CUSTADDR

                                                      FUNCTION ACTIVITY

            PROCEDURE    REQUEST     DL/I    REF.      CPU TIME PERCENT       CPU TIME HISTOGRAM  MARGIN OF ERROR:  3.34%
LINE NO.    NAME         LOCATION    FUNC    NUMBER      SOLO     TOTAL       .00      11.00      22.00      33.00      44.00

 75400      CALL         000016D2    GU      000001       .12       .12       .
118593      CALL         0000235C    GU      000002     42.44     43.14       .**************************************+
125800      P113-SEG     000024E8    GNP     000003       .35       .35       .
136994      CALL         000028AE    ISRT    000004       .12       .12       .
136994      CALL         000028AE    GU      000005     13.26     13.26       .************
                                                        -----     -----
TOTALS                                                  56.28     56.98
```

Figure 1-6. Sample Wait by DL/I Request Report

```
                                                  ** WAIT BY DL/I REQUEST **


TRANSACTION - STRID130
MODULE      - STRIC130
SECTION     - STRIC130
PSB         - STRIC130
                                                      CALL PARAMETERS

    REF      PCB   PCB NAME   RESOURCE
    NUMBER   TYPE  OR LABEL   NAME          SSA DATA

    000001   I/O   IOPCB
    000002   DB    CUSPCB     STRIDCUS      CUSTROOT(CUSACTNO =????
                                            CHCKSEGM*L
    000003   DB    CUSPCB     STRIDCUS      CUSTROOT(CUSACTNO =????
                                            CHCKSEGM*-
    000004   I/O   IOPCB

                                                      FUNCTION ACTIVITY

            PROCEDURE    REQUEST     DL/I    REF.      RUN TIME PERCENT       RUN TIME HISTOGRAM  MARGIN OF ERROR:  3.34%
LINE NO.    NAME         LOCATION    FUNC    NUMBER      PAGE     TOTAL       .00      2.00       4.00       6.00       8.00

                         00001A3E    GU      000001       .00       .51       .++
                         00001E0C    GU      000002       .00      7.85       .+++++++++++++++++++++++++++++++++++++++
                         00001F3C    ISRT    000003       .00       .07       .
                         000022B8    ISRT    000004       .00       .02       .
                                                        -----     -----
TOTALS                                                    .00      8.46
```

The Attribution of CPU Execution Time Report for IMS Environments

The Attribution of CPU Execution Time reports identify what system service routines (for IMS Version 3 and higher) were invoked by a specific module. These reports also indicate the location in the calling module that invoked the system service routine. Refer to these reports to identify the DL/I service calls causing activity in a system service routine.

Header Lines

The report header identifies the invoked routine, and shows

- its pseudo-module, module, and control section name (when available)
- a function descriptor for either the control section or the module

Detail Lines

For each IMS service routine in which the STROBE IMS Feature identifies CPU activity, the report identifies the transaction that invoked the module by

- transaction name
- module and control section name
- return address (the offset of the DL/I service call within the module or control section)
- line number and procedure name for indexed IMS applications
- solo and total CPU time spent on behalf of the invoking transaction

VIA Section

If the invoking transaction has not directly called the service routine, the VIA section displays an intermediate routine called by the invoking site. The report shows the module name, the control section, and the function descriptor of the control section or module invoking the module.

Total Line

The total line shows the total time attributed to the modules and transactions that invoked the IMS service routines. It may be less than the time shown in the Program Usage by Procedure or Most Intensively Executed Procedures reports because STROBE cannot always identify the invoker of a service routine.

Figure 1-7 on page 1-14 shows sample Attribution of CPU Execution Time reports for modules DFSDLA00 and DFSDLR00. This example is discussed in “Attribution of CPU Wait Time” on page 3-9.

Figure 1-7. Sample Attribution of CPU Execution Time Report

```
                                        ** ATTRIBUTION OF CPU EXECUTION TIME **

 .IMS     DFSDLA00 DFSDLAS0  DB-ANALYZE/PROCESS SSA
 --------------------------WAS INVOKED BY---------------------   ------------------VIA-----------------------  CPU TIME %
 XACTION  MODULE   SECTION    RETURN   LINE   PROCEDURE NAME       MODULE   SECTION  FUNCTION                   SOLO  TOTAL

 STRID110 STRIC110            00235C 118593      CALL              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM      4.77  4.77
                                                                                                                ----- -----
                                                                                                                4.77  4.77

 .IMS     DFSDLA00 DFSDLA00  DB-CALL ANALYZER
 --------------------------WAS INVOKED BY---------------------   ------------------VIA-----------------------  CPU TIME %
 XACTION  MODULE   SECTION    RETURN   LINE   PROCEDURE NAME       MODULE   SECTION  FUNCTION                   SOLO  TOTAL

 STRID110 STRIC110            00235C 118593      CALL              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM      8.72  8.84
                                                                                                                ----- -----
                                                                                                                8.72  8.84

 .IMS     DFSDLR00 DFSDLR00  DB-LOGICAL RETRIEVE
 --------------------------WAS INVOKED BY---------------------   ------------------VIA-----------------------  CPU TIME %
 XACTION  MODULE   SECTION    RETURN   LINE   PROCEDURE NAME       MODULE   SECTION  FUNCTION                   SOLO  TOTAL

 STRID110 STRIC110            00235C 118593      CALL              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     11.74 11.98
                                                                                                                ----- -----
                                                                                                               11.74 11.98
```

The Attribution of CPU Wait Time Report for IMS Environments

The Attribution of CPU Wait Time reports identify what system service routines (for IMS Version 3 and higher) were invoked by a specific module. These reports also indicate the location in the calling module that invoked the system service routine. Refer to these reports to identify DL/I service calls causing wait in IMS system service routines.

Header Lines

The report header identifies the invoked routine, showing

- its pseudo-module, module, and control section name (when available)
- a function descriptor for either the control section or the module

Detail Lines

For each IMS service routine in which the STROBE IMS Feature identifies CPU activity, the report identifies the transaction that invoked the module by

- transaction name
- module and control section name
- return address (the offset, within the module or control section, of the DL/I service call)
- for indexed IMS applications, the line number and procedure name
- solo and total CPU time spent on behalf of the invoker

VIA Section

If the invoking transaction has not directly called the service routine, the VIA section displays an intermediate routine called by the invoking site. The report shows the module name, the control section, and the function descriptor of the control section or module invoking the module.

If the invoked module controls file access activities, the report shows, instead of the control section name, the data definition name of the data set currently serviced by the invoked module. In the example shown in Figure 1-8, STRIDLON is a data definition name of a data set against which I/O is currently taking place.

Total Line

The total line shows the total time attributed to the modules and transactions that invoked the IMS service routines. It may be less than the time shown in the Wait Time by Module report because STROBE cannot always identify an invoker of a service routine.

In this example (Figure 1-8), control section DFSKBDP0 of module DFSKBDP0 shows wait resulting from DL/I requests by module STRIL140. This example is discussed in "Attribution of CPU Wait Time" on page 3-9.

Figure 1-8. Sample Attribution of CPU Wait Time Report

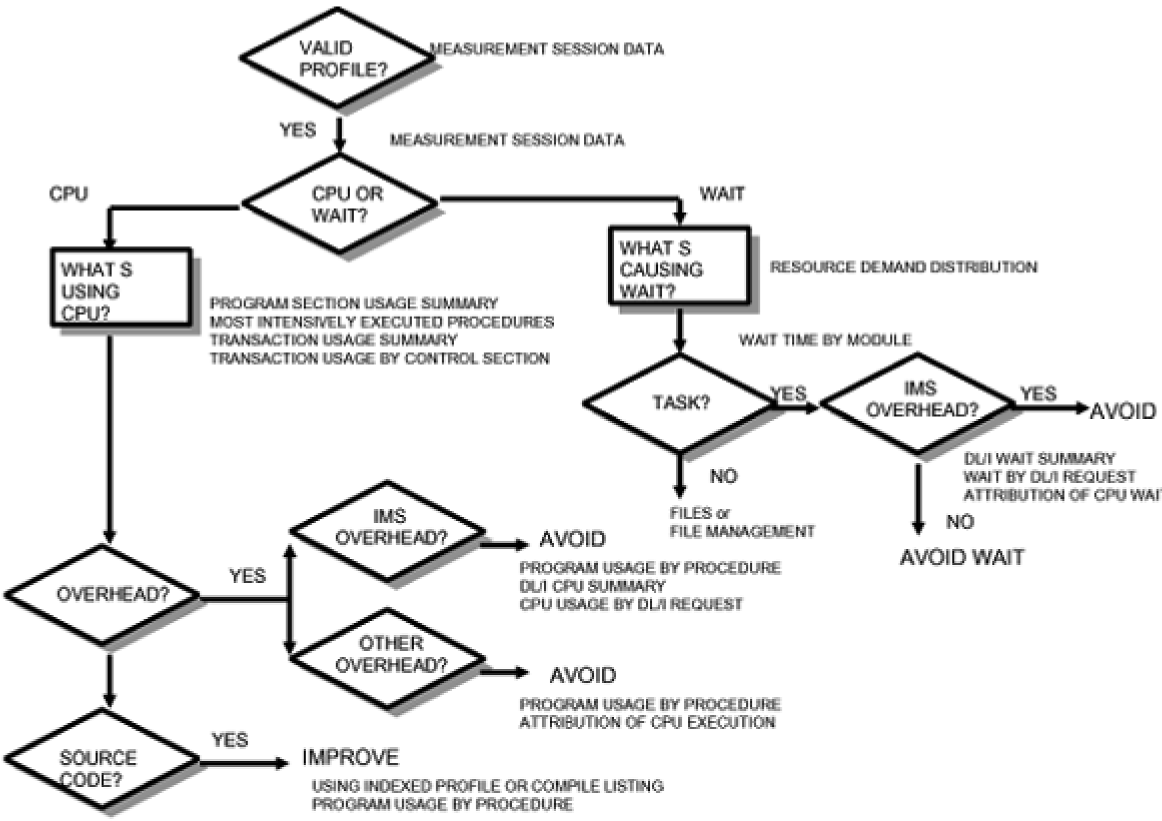
```
                                                  ** ATTRIBUTION OF CPU WAIT TIME **

.IMS      DFSKBDP0 DFSKBDP0  DB-IMS BATCH DISPATCHING
---------------------------WAS INVOKED BY---------------------   -----------------VIA----------------------- WAIT TIME %
XACTION  MODULE   SECTION    RETURN   LINE   PROCEDURE NAME       MODULE   SECTION  FUNCTION                   PAGE  TOTAL

         STRIL140 ***L1401   0001CC     17      CALL              DFSPR000          DB-CTL, BATCH PROG REQ     1.90 44.21
         STRIL140 ***L1401   0001CC     17      CALL              DFSPR000 STRIDLON DB-CTL, BATCH PROG REQ      .00 10.95
                                                                                                              ----- -----
                                                                                                               1.90 55.17
```

Analyzing the Reports by IMS Region Type

Because the attributes of IMS region types differ, your analysis of reports in the STROBE Performance Profile must focus on the specific performance improvement opportunities each region type affords. This section lists some key reports that apply to each region type and tells you where you can find an example of each report.

The flowchart in Figure 1-9 on page 1-16 shows a logical path for analyzing STROBE Performance Profile reports. You will follow the path in different ways, depending on what opportunities the STROBE Performance Profile exposes and on whether your primary focus is application programs or system-level modules. First, though, walk through the flowchart with IMS regions in mind.

Figure 1-9. Analyzing STROBE Performance Profile Reports for IMS



To determine the region type and whether CPS TIME PERCENT and WAIT TIME PERCENT show improvement opportunities, analyze the Measurement Session Data report. A typical IMS application program shows relatively high wait time when there is intensive database I/O activity or when the region is waiting for work. Nonetheless, you may be able to reduce CPS time even if it is much smaller than the wait time.

To reduce CPU time, first determine what is using CPU time by examining the Program Section Usage Summary and the Transaction reports. If system service modules consume most of the CPU time, determine your primary focus.

- If your focus is IMS services for DL/I application programs, you should analyze the DL/I CPU Summary and CPU Usage by DL/I Request reports.
- If your focus is other system service routines, analyze the Attribution of CPU Execution Time reports.

If most of the CPU time is consumed by application program source code, then you should analyze the STROBE Performance Profile as described in *STROBE MVS Concepts and Facilities*.

To analyze wait time, examine the Resource Demand Distribution report to determine what is causing the largest percentage of it. If IMS database file activity consumes most of the time, then analyze the STROBE Performance Profile as described in *STROBE MVS Concepts and Facilities*. If most of the time is consumed by an IMS task, then examine the Wait Time by Module report. If IMS system service routines consume most of the wait time, then analyze the DL/I Wait Summary, Wait by DL/I Request, and the Attribution of CPU Wait Time reports.

Analyze CICS/DBCTL regions in basically the same way that you analyze IMS regions, as described above, but use the CICS Performance Supplement transaction reports, Transaction Summary and CPU Usage by Control Section for transaction Analysis.

Because there are no transaction reports for DL/I batch jobs, to analyze the reports for a batch processing program, begin with the Program Section Usage Summary report. If system service modules consume most of the CPU time, determine your primary focus. If your focus is IMS services for DL/I application programs, then analyze the DL/I CPU Summary and CPU Usage by DL/I Request reports. If your focus is on other system service routines, analyze the Attribution of CPU Execution Time reports. If most of the time is consumed by application program source code, then analyze the STROBE Performance Profile as described in *STROBE MVS Concepts and Facilities*.

The following table lists the reports to focus on according to the region you want to analyze.

Type of region	**Reports to examine**
MPR and IFP	Measurement Session Data Transaction Summary and Transaction Usage by Control Section Attribution of CPU Execution Time Wait Time by Module Attribution of CPU Wait Time DL/I CPU Summary DL/I Wait Summary CPU Usage by DL/I Request Wait by DL/I Request
BMP or DLB	Measurement Session Data Program Section Usage Summary and Program Usage by Procedure Attribution of CPU Execution Time DL/I CPU Summary CPU Usage by DL/I Request Resource Demand Distribution Data Set Characteristics For DLB regions only, I/O Facility Utilization Summary and DASD Usage by Cylinder Wait Time by Module Attribution of CPU Wait Time DL/I Wait Summary Wait by DL/I Request
CICS/DBCTL	Measurement Session Data Resource Demand Distribution Transaction Summary and CPU Usage by Control Section Attribution of CPU Execution Time DL/I CPU Summary CPU Usage by DL/I Request
Control	Measurement Session Data Transaction Summary and Transaction Usage by Control Section Program Section Usage Summary and Program Usage by Procedure Resource Demand Distribution Data Set Characteristics I/O Facility Utilization Summary DASD Usage by Cylinder
DLISAS	Measurement Session Data Resource Demand Distribution Data Set Characteristics I/O Facility Utilization Summary Transaction Usage Summary and Transaction Usage by Control Section

Where to Find More Information

The following table lists the chapters or sections that provide information according to the task you are interested in accomplishing.

For information on	**Refer to**
Using the STROBE IMS Feature	Chapter 2, “Using the STROBE IMS Feature”
A STROBE Performance Profile from an MPR region	“Analyzing the Reports for an MPR Region” on page 3-1
A STROBE Performance Profile from a DLB region	“Analyzing the Reports for a DL/I Batch Processing Region” on page 3-10
A STROBE Performance Profile from a CICS/DBCTL region	Chapter 4, “The STROBE Performance Profile for CICS/DBCTL Regions”
A STROBE Performance Profile from a control region	“Analyzing the Reports from an IMS Control Region” on page 5-1
A STROBE Performance Profile from a DLISAS region	“Analyzing the Reports for a DL/I Separate Address Space” on page 5-5

Chapter 2.
Using the STROBE IMS Feature

You can find detailed instructions for submitting measurement requests in the STROBE/ISPF Online Tutorials, the *STROBE MVS User's Guide*, and the *STROBE MVS User's Guide with Advanced Session Management*. For a description of managing measurement sessions, see *STROBE MVS Concepts and Facilities*.

There are a few considerations to keep in mind when submitting measurement requests and managing measurement sessions in an IMS environment. This chapter discusses these considerations, and describes how to create a STROBE Performance Profile.

Measuring an IMS Region

The structure of your STROBE measurement request depends on both the type of application and the information you are interested in obtaining. The following subsections offer some guidelines.

Deciding What to Measure

In an IMS subsystem, the IMS control region performs all terminal control functions and schedules incoming transactions for processing in one or more dependent regions. To study the resource demands associated with a particular IMS transaction or application, you need to measure the dependent region that services the transaction or application itself.

Both the DLISAS and IMS control regions can own the database data sets. To obtain a complete picture of your DASD performance for a dependent region, start concurrent measurement sessions in both the IMS control and DLISAS regions.

For DLB (IMS batch DL/I) applications, physical I/O occurs in the same address space in which the application modules execute. To see CPU, I/O activity, and attribution of DL/I service routines, measure the application.

Deciding When to Measure

In the case of a DL/I application executing in an online environment (such as MPRs, IFPs, and CICS), regularly scheduled measurement sessions conducted during peak periods can indicate trends in resource demand. You can initiate sampling during periods of interest and stop sampling during periods you do not need to measure. By switching sample data sets, you can isolate measurement session data for different programs in different sample data sets.

You can also measure an IMS environment and obtain periodic performance reports without interrupting the measurement process. To do this, switch to a new sample data set, releasing the previous sample data set. You can then produce a STROBE Performance Profile from the released sample data set while sampling continues in the new sample data set.

To get a complete picture of a batch IMS application's activity, you should measure it, or the BMP region, over the entire duration of the job step. To do so, submit a measurement request for each job step of interest prior to the execution of the batch job. To ensure efficient sampling, specify an estimate of the run time for each job step.

Measuring CICS/DBCTL Regions

Before you measure a CICS/DBCTL region, ensure that the DBCTL connection is already active. Otherwise, the STROBE CICS Feature issues message STR4128I DBCTL CONNECTION NOT ACTIVE; DBCTL DATA COLLECTOR QUIESCED and does not collect DBCTL-specific data.

If you function ship (the process by which CICS accesses resources on another CICS system) DL/I requests to the CICS/DBCTL region through MRO/ISC, or if you route DL/I transactions to the region, you should measure the region that owns the DBCTL connection.

STROBE invokes DBCTL DL/I attribution automatically and will produce attribution reports even if you suppress the CICS Performance Supplement. If, however, you specify CICS=NOATTR when you submit the measurement request, STROBE will not collect attribution data for either CICS or DBCTL.

For more information on measuring CICS regions, see the STROBE *STROBE CICS Feature*.

Measuring Multiple Address Spaces at the Same Time

If you have licensed the STROBE Advanced Session Management Feature, you can create and save groups of STROBE measurement requests to be processed at a later time. These collections of measurement requests are called *request groups*. Each of the measurement requests in a request group is known as a *request group element*.

You can create associations between request group elements. This capability allows you to measure jobs that are executing in different, but related, address spaces at the same time. For example, you can measure an IMS application that processes data managed by DB2. You can then see a more complete picture of the application's overall performance by reviewing the Performance Profiles for both the IMS and the DB2 regions. This capability can be particularly useful during the testing phase of application development.

For more information, see Chapter 2 in the *STROBE MVS User's Guide with Advanced Session Management*.

Collecting IMS Data

If your installation uses the standard IBM-supplied names (DFSMVRC0 for control and DL/I regions, DFSRRC00 for dependent regions and batch) for the load modules invoked from the EXEC statement that initializes an IMS job step, STROBE automatically invokes the STROBE IMS Feature whenever you measure an IMS region.

If your installation does not use the standard names for these load modules, then the method you use to invoke the STROBE IMS Feature depends on how your STROBE system programmer configured your STROBE system. You may need to specify the IMS operand on the STROBE command language ADD operation or enter a “Y” in the IMS field of the STROBE - DATA COLLECTORS panel (Figure 2-3 on page 2-4). Check with your STROBE system programmer to determine whether you must specify this operand.

Collecting Transaction Count and Average Service Time Information

For MPR regions, STROBE identifies the number of times a transaction executed during the measurement session, as well as the average service time for each transaction. This information is collected by default, and is displayed on the Transaction Summary report in the Performance Profile.

Capturing Additional Transaction Data

Because STROBE automatically collects the transaction count and service time data, you do not need to specify any additional parameters when measuring MPR regions.

For very active MPR regions, however, you may need to increase the size of the buffer STROBE uses to store transaction count and service time data during the measurement session. The default for the buffer is 8 kilobytes.

To increase the size of the data capture buffer, complete the following steps:

1. Select Option 1 from the STROBE OPTIONS menu. STROBE/ISPF displays the STROBE - ADD ACTIVE REQUEST panel (Figure 2-1).

Figure 2-1. STROBE - ADD ACTIVE REQUEST Panel

```
----------------------  STROBE - ADD ACTIVE REQUEST -------------------------
COMMAND ===>

JOBNAME ===> IMSTESA    (Jobname or clear to list active jobs)


SYSTEM  ===> TLP1       (System or clear to list available systems)
AUTO PROFILE CREATION  ===>  Y (Y or N; Use Y only when overriding defaults)

MEASUREMENT SESSION INFORMATION:
  SESSION DURATION     ===> 1         (Estimated time in minutes)
  TARGET SAMPLE SIZE   ===> 10000     (Target number of samples)

TSO USERID TO NOTIFY   ===> WPAAZS    (Notify when session completes)

SAMPLE DATA SET INFORMATION:
  DATA SET NAME PREFIX ===> ZZ
  UNIT NAME   ===> WPAANY   VOLUME ===>        DISP ===> CATLG (CATLG or KEEP)

SELECT ADDITIONAL PARAMETERS: (Y or N; Use Y only when overriding defaults)
  DATA COLLECTORS      ===> N      MODULE MAPPING DATA             ===> N
  SESSION MANAGEMENT   ===> N      REQUEST RETENTION               ===> N
  OTHER PARAMETERS     ===> Y
```

2. Enter "Y" in the OTHER PARAMETERS field and press **Enter**. STROBE/ISPF displays the STROBE - OTHER PARAMETERS panel (Figure 2-2).
3. In the OTHER PARAMETERS field, specify IMS=(CAPTBUFF=*nnnn*), where *nnnn* is the maximum amount, in kilobytes, of virtual storage used for the data capture buffer. The default for the buffer is 8 kilobytes.
4. Press **Enter** to submit the measurement request.

Figure 2-2. STROBE - OTHER PARAMETERS Panel (Specifying Data Capture Buffer Size)

```
------------------ STROBE - OTHER PARAMETERS ---------------------------------
COMMAND ===>

OTHER PARAMETERS FOR JOBNAME :   IMSTESA


OTHER PARAMETERS ===> IMS=(CAPTBUFF=100)
```

If you are using the STROBE command language, specify IMS=(CAPTBUFF=*nnnn*) when you submit the ADD operation to define the size of the data capture buffer.

Suppressing Transaction Count and Service Time Information

If you do *not* wish to collect transaction count and service time information, complete the following steps:

1. Select Option 1 from the STROBE OPTIONS menu. STROBE/ISPF displays the STROBE - ADD ACTIVE REQUEST panel (Figure 2-1 on page 2-3).
2. Enter “Y” in the DATA COLLECTORS field and press **Enter**. STROBE/ISPF displays the STROBE - DATA COLLECTORS panel (Figure 2-3).
3. Enter "N" in the IMS field of CAPTURE Options section on the STROBE - DATA COLLECTORS panel.
4. Press **Enter** to submit the measurement request.

Note: Complete these steps only if you do *not* wish to collect additional transaction information.

Figure 2-3. STROBE - DATA COLLECTORS Panel

```
 -------------------------- STROBE - DATA COLLECTORS -------------------------
COMMAND ===>

OVERRIDE DATA COLLECTOR DEFAULTS FOR JOBNAME:  WPAFXC

DATA COLLECTORS: (Y or N; Y adds to and N removes from your system defaults)
  ADABAS           ===>     ADA3GL           ===>     C                ===>
  CICS             ===>     COBOL            ===>     CSP              ===>
  DB2              ===>     IDMS             ===>     IDMS BATCH DML   ===>
  IEF              ===>     IMS              ===>     NATURAL          ===>
  PL/I             ===>     SVC              ===>


CICS Options: (Y or N; default is Y)
 Produce Performance Supplement ===>   Collect terminal activity ===>


CAPTURE Options: (Y or N; default is Y)
          DB2    ===>    IMS    ===>  N


OTHER DATA COLLECTORS:
  PROGRAM NAME   ===>           ===>           ===>           ===>
  PROGRAM NAME   ===>           ===>           ===>           ===>
```

If you are using the STROBE command language, specify IMS=NOCAPTURE when you submit the ADD operation if you do *not* wish to collect additional transaction information.

Disabling the STROBE IMS Feature

To specify that STROBE *not* invoke the STROBE IMS Feature

1. Select Option 1 or Option 2 from the STROBE OPTIONS menu. STROBE/ISPF displays the STROBE - ADD ACTIVE REQUEST panel (Figure 2-1 on page 2-3) or the STROBE - ADD QUEUED REQUEST panel, depending on your selection.
2. Enter “Y” in the DATA COLLECTORS field of the STROBE - ADD ACTIVE REQUEST or the STROBE - ADD QUEUED REQUEST panel.
3. Enter "N" in the IMS field of the subsidiary STROBE - DATA COLLECTORS panel (Figure 2-3).
4. Press **Enter** to submit the measurement request.

If you are using the STROBE command language, specify the NOIMS operand when you submit an ADD operation to disable the STROBE IMS Feature.

Note: Specifying NOIMS disables all IMS data collection, including DL/I attribution.

Disabling STROBE IMS Attribution

By default, STROBE gathers attribution data to produce the Attribution of CPU Execution Time and Wait Time reports. To suppress collection of attribution data for these reports without disabling all IMS data collection

1. Select Option 1 or Option 2 from the STROBE OPTIONS menu. STROBE/ISPF displays the STROBE - ADD ACTIVE REQUEST panel (Figure 2-1 on page 2-3) or the STROBE - ADD QUEUED REQUEST panel, depending on your selection.
2. Enter "Y" in the OTHER PARAMETERS field and press **Enter**. STROBE/ISPF displays the STROBE - OTHER PARAMETERS panel (Figure 2-2 on page 2-3).
3. In the OTHER PARAMETERS field, specify IMS=NOATTR.
4. Press **Enter** to submit the measurement request.

Figure 2-4. STROBE - OTHER PARAMETERS Panel (Suppressing Attribution)

```
------------------- STROBE - OTHER PARAMETERS ---------------------------------
COMMAND ===>

OTHER PARAMETERS FOR JOBNAME :   IMSTESA


OTHER PARAMETERS ===> IMS=NOATTR
```

If you are using the STROBE command language, specify the IMS=NOATTR operand when you submit an ADD operation to suppress the collection of attribution data.

Note: Specifying NOIMS or NOATTR disables DL/I CPU Time and Wait data collection.

Creating a STROBE Performance Profile

To create a STROBE Performance Profile

- with STROBE/ISPF, select Option 4 from the STROBE OPTIONS menu
- in batch, execute the STROE procedure

You can find detailed information about creating a STROBE Performance Profile in the STROBE/ISPF Online Tutorials, the *STROBE MVS User's Guide,* or the *STROBE MVS User's Guide with Advanced Session Management*.

Once you have created the STROBE Performance Profile, analyze the reports to identify performance improvement opportunities. The remaining chapters of this book present a sample analysis of STROBE Performance Profiles for IMS dependent regions, CICS/DBCTL regions, and IMS supervisory regions.

There may be times when you would like to suppress some of the IMS-specific reports in the STROBE Performance Profile. The following subsections describe which reports can be suppressed, and how to suppress them.

Suppressing DL/I CPU and Wait Reports

You can suppress the DL/I CPU and Wait reports in the STROBE Performance Profile by specifying the NODLI option through either STROBE/ISPF or the STROE or STROXE procedure.

With STROBE/ISPF, enter “Y” in the DETAIL REPORTS field of the primary STROBE - PRODUCE A PERFORMANCE PROFILE panel (Figure 2-5).

Figure 2-5. STROBE - PRODUCE A PERFORMANCE PROFILE Panel

```
-------------------- STROBE - PRODUCE A PERFORMANCE PROFILE -------------------
OPTION ===>  B

     B  - Background processing    F  - Foreground processing

ENTER BLANKS TO VIEW A DATASET SELECTION LIST
SAMPLE DATA SET NAME ===> 'WPAJJN.IMSV4R1.WPACI330.S001D001'

                UNIT ===>           VOLUME ===>

SPECIFY PROFILE REPORT PARAMETERS: (Y or N)
  Detail Reports   ===> Y    Tailor Reports   ===> Y    Indexing   ===> N

PROFILE REPORT FORMAT ===>    ((W)ide or (N)arrow)

NUMBER OF COPIES FOR BACKGROUND REPORTS ===> 1

Specify a data set name to save a copy of the STROBE Profile Report:
DATA SET NAME ===>
         UNIT ===> WPAANY    VOLUME ===>

Specify a SYSIN data set containing parameters for the Reporter:
DATA SET NAME ===>
```

Then, on the subsidiary STROBE - DETAIL FOR A PERFORMANCE PROFILE panel, specify NODLI in the OTHER PARAMETERS field (Figure 2-6).

Figure 2-6. STROBE - DETAIL FOR A PERFORMANCE PROFILE Panel

```
---------  STROBE - DETAIL FOR A PERFORMANCE PROFILE  -----------------------
COMMAND ===>

SAMPLE DATA SET: 'WPAJJN.IMSV4R1.WPACI330.S001D001'


REPORT OPTIONS:
  TITLE      ===>

  COMPRESS   ===> AAA =.AAAA      ===>      =.          ===>      =.
             ===>     =.          ===>      =.          ===>      =.
             ===>     =.          ===>      =.          ===>      =.
             ===>     =.          ===>      =.          ===>      =.

  DETAIL     ===>          ===>          ===>          ===>
             ===>          ===>          ===>          ===>
             ===>          ===>          ===>          ===>

  RESOLUTION ===> 32      SORT SIZE ===>           LINES/PAGE ===> 60

OTHER PARAMETERS ===> NODLI
```

If you are using the STROE or STROXE procedure, specify the NODLI option on the RPTPARM parameter to suppress the DL/I CPU and Wait reports.

Suppressing Attribution Reports in the STROBE Performance Profile

To limit or suppress the Attribution of CPU Execution Time and Wait Time reports in the STROBE Performance Profile, specify any of the parameters described in the following sections.

Suppressing Attribution Reports with Low Activity

You can suppress attribution reports for any system service module in which the total CPU or wait time percentage is less than a specified baseline. To do this, specify the ATTR=*nn.n* parameter, where *nn.n* is the baseline percentage.

- With STROBE/ISPF, enter "Y" in the TAILOR REPORTS field of the primary STROBE - PRODUCE A PERFORMANCE PROFILE panel. On the subsidiary TAILOR REPORTS panel, specify a baseline percentage between 00.1 and 99.9 in the "Compress below %" portion of the ATTRIBUTION Reports field (Figure 2-7).
- When you submit a batch job using the STROE or STROXE procedure, specify ATTR=*nn.n*.

Figure 2-7. STROBE - TAILOR REPORTS Panel (Attribution Reports with Low Activity)

```
--------------------------- STROBE - TAILOR REPORTS ---------------------------
COMMAND ===>

WAIT TIME BY MODULE -- Show location of wait  ===>            (Specify Y for a
                                                              selection except
                                     Compress                 where % required)
-------------- Report -------------- below %   or  Suppress
PROGRAM USAGE BY PROCEDURE            ===>          ===>
DASD USAGE BY CYLINDER                ===>          ===> Y
TRANSACTION USAGE BY CONTROL SECTION  ===>          ===>
ATTRIBUTION Reports                   ===> 4.5      ===>

  Suppress reports for C         ===>   CICS      ===>   COBOL     ===>
                       CSP       ===>   DB2       ===>   DL/I      ===>
                       IDMS      ===>   IEF       ===>   PL/I      ===>
                       SVC       ===>

PROGRAM SECTION USAGE SUMMARY              Display inactive  ===>
TIME and RESOURCE DEMAND DISTRIBUTION      Combine tasks     ===>
                                           Display all tasks ===>
                                           Display all DDs   ===>


USE DATE AND TIME FORMAT FROM PARMLIB ===>
```

Suppressing All Attribution Reports

To suppress *all* Attribution reports

- With STROBE/ISPF, enter "Y" in the TAILOR REPORTS field of the primary STROBE - PRODUCE A PERFORMANCE PROFILE panel. Then, on the subsidiary TAILOR REPORTS panel, enter "Y" in the SUPPRESS portion of the ATTRIBUTION Reports field.
- With the STROE or STROXE procedure, specify the NOATTR operand.

Suppressing IMS-Specific Attribution Reports

To suppress the Attribution of CPU Execution and Wait Time reports for IMS service modules *only*

- With STROBE/ISPF, enter "Y" in the TAILOR REPORTS field of the primary STROBE - PRODUCE A PERFORMANCE PROFILE panel. Then, on the subsidiary TAILOR REPORTS panel, enter "Y" in the Suppress reports for DL/I field (Figure 2-8 on page 2-8).
- With the STROE or STROXE procedure, specify the NOATTR=IMS operand.

Figure 2-8. STROBE - TAILOR REPORTS Panel (Suppressing IMS Attribution Reports)

```
--------------------------- STROBE - TAILOR REPORTS ---------------------------
COMMAND ===>

WAIT TIME BY MODULE -- Show location of wait  ===>            (Specify Y for a
                                                               selection except
                                     Compress                  where % required)
-------------- Report -------------- below %   or  Suppress
PROGRAM USAGE BY PROCEDURE            ===>          ===>
DASD USAGE BY CYLINDER                ===> 2.0      ===>
TRANSACTION USAGE BY CONTROL SECTION  ===>          ===>
ATTRIBUTION Reports                   ===>          ===>

  Suppress reports for C         ===>   CICS      ===>   COBOL     ===>
                       CSP       ===>   DB2       ===>   DL/I      ===> Y
                       IDMS      ===>   IEF       ===>   PL/I      ===>
                       SVC       ===>

PROGRAM SECTION USAGE SUMMARY            Display inactive  ===>
TIME and RESOURCE DEMAND DISTRIBUTION    Combine tasks     ===>
                                         Display all tasks ===>
                                         Display all DDs   ===>


USE DATE AND TIME FORMAT FROM PARMLIB ===>
```

Chapter 3.
The STROBE Performance Profile for Dependent Regions

This chapter shows reports from two sample STROBE Performance Profiles: one from an online application executing in an MPR region and one from a DL/I batch processing application. For information about STROBE Performance Profiles produced in a CICS/DBCTL environment, see Chapter 4, “The STROBE Performance Profile for CICS/DBCTL Regions”. For information about Profiles produced from an IMS control region or DL/I Separate Address Space, see Chapter 5, “The STROBE Performance Profile for IMS Supervisory Regions”.

Analyzing the Reports for an MPR Region

The Measurement Session Data report (Figure 3-1) describes the environment during a measurement session. When STROBE measures a job step executing in an IMS region, the SUBSYSTEM field shows the region type, the version of IMS, and the Local Storage Option (LSO). In this example, the region identifier “MPR” shows that this is a message processing region.

Because both the DLISAS and IMS control regions can own the database data sets, start concurrent measurement sessions in both the IMS control and DLISAS regions to obtain a complete picture of your DASD performance for a dependent region.

Figure 3-1. Measurement Session Data Report for MPR Regions

```
                                             ** MEASUREMENT SESSION DATA **

-------- JOB ENVIRONMENT --------      ------- MEASUREMENT PARAMETERS ------       ----- MEASUREMENT STATISTICS ----

PROGRAM MEASURED   -    DFSRRC00       ESTIMATED SESSION TIME  -      1 MIN        CPS TIME PERCENT -           19.24
JOB NAME           -    WPAMP1V4       TARGET SAMPLE SIZE      -     15,000        WAIT TIME PERCENT -          80.76
JOB NUMBER         -    JOB06728       REQUEST NUMBER     (A)  -        568        RUN MARGIN OF ERROR PCT  -     .76
STEP NAME   -      IMSMSG.REGION       FINAL SESSION ACTION    -       QUIT        CPU MARGIN OF ERROR PCT  -    1.47

DATE OF SESSION    -  06/08/1998       OPTIONS -  IMS                              TOTAL SAMPLES TAKEN -        4,469
TIME OF SESSION    -    10:34:46                                                   TOTAL SAMPLES PROCESSED -    4,469
CONDITION CODE     -      C-0000       --------- REPORT PARAMETERS ---------       INITIAL SAMPLING RATE- 250.00/SEC
                                       REPORT RESOLUTION     -      64 BYTES       FINAL SAMPLING RATE  - 250.00/SEC
SYSTEM -                ESA SP5.2.0    SORTSIZE              -       999,999
DFSMS              -          1.2.0    LINES/PAGE            -            60       SESSION TIME -    0 MIN 59.03 SEC
SUBSYSTEM   -     IMS MPR 4.1 L=S                                                  CPU TIME -        0 MIN  8.93 SEC
CPU MODEL          -    3090-600S      NODASD  ATTR= 0.0%                          WAIT TIME    -    0 MIN 37.41 SEC
SMF/SYSTEM ID -       MVST/TLP002                                                  STRETCH TIME -    0 MIN 12.69 SEC
                                       DATE FORMAT                MM/DD/YYYY
REGION SIZE BELOW 16M  -  4,160K       TIME FORMAT (24 HOURS)       HH:MM:SS       SRB TIME     -    0 MIN  0.34 SEC
REGION SIZE ABOVE  -      32,768K                                                  SERVICE UNITS-              14889

PTF LVL- 2.2.1.FS000000/FS000000                                                   PAGES IN-      0      OUT-       0
STROBE TAPE NUMBER -  000-S00DSK                                                   PAGING RATE  -            0.00/SEC
                                                                                   EXCPS -      241          4.08/SEC

SAMPLE DATA SET  - WPAMJ2.V4.WPAMP1V4.S001D001
```

Choosing Between the Execution and Wait Reports

When there is intensive database I/O activity or when the dependent region is waiting for work, wait time for a typical IMS application program is relatively high. Nonetheless, CPS time may still offer opportunities for improvement, even if it is much smaller than the wait time. To reduce CPU consumption, first determine what is using CPU time by examining the Program Section Usage Summary and the Transaction reports. If most of the time is consumed by application programs, then analyze the STROBE Performance Profile as described in *STROBE MVS Concepts and Facilities*. If most of the CPU time is consumed by system service modules, decide on your primary focus. If your focus is on IMS services for DL/I application programs, then analyze the DL/I CPU Summary and CPU Usage by DL/I Request reports. If the focus is on other system service routines, analyze the Attribution of CPU Execution Time reports.

If you want to analyze the wait time, first examine the Wait Time by Module report. If most of the wait time is consumed by system service routines, decide on your primary focus. If your focus is on IMS services for DL/I application programs, then analyze the DL/I Wait Summary and Wait by DL/I Request reports. If your focus is on other system service routines, analyze the Attribution of CPU Execution Time reports.

The Program Section Usage Summary report (Figure 3-2) shows the activity of each program module and subsystem that was active during the measurement session.

In this example, a high percentage of the CPU time was spent executing IMS system service modules. To reduce CPU usage by IMS services for DL/I application programs, analyze the DL/I CPU Summary and CPU Usage by DL/I Request reports.

Figure 3-2. Program Section Usage Summary Report for MPR Regions

```
                                            ** PROGRAM SECTION USAGE SUMMARY **


  MODULE  SECTION 16M   SECT  FUNCTION                 CPU TIME PERCENT      CPU TIME HISTOGRAM  MARGIN OF ERROR:  3.34%
    NAME  NAME     ,   SIZE                           SOLO     TOTAL        .00     19.00      38.00      57.00     76.00

 .SYSTEM  .COBLIB             COBOL LIBRARY SUBROUTINE   5.23      5.23        .**
 .SYSTEM  .IMS                IMS SYSTEM SERVICES       73.72     74.65        .**************************************+
 .SYSTEM  .IRLM               RESOURCE LOCK MANAGER       .47       .47        .
 .SYSTEM  .PL/ILIB            PL/I LIBRARY SUBROUTINES    .12       .12        .
 .SYSTEM  .PRIVATE            PRIVATE AREA                .23       .23        .
 .SYSTEM  .SVC                SUPERVISOR CONTROL         2.44      2.44        .*
 .SYSTEM  .VSAM               VIRTUAL STORAGE ACC METH  13.95     14.19        .*******
                                                        -----     -----
 .SYSTEM  TOTALS              SYSTEM SERVICES           96.16     97.33

 STRIC110             19232                              1.63      1.63        .
 STRIC120             15320                               .12       .12        .
 STRIC130              9704                               .12       .12        .
 STRIL110             28168                               .70       .70        .
 STRIL130             13792                               .12       .12        .
                                                        -----     -----
 PROGRAM DFSRRC00 TOTALS                                98.84    100.00
```

Identifying CPU Usage in an MPR Region

The DL/I CPU Summary report (Figure 3-3 on page 3-3) identifies the total CPU time by the transaction, module, section, and PSB name that initiated the request for IMS DL/I services.

In this example, more than 56% of the CPU time was spent executing PSB STRIC110 of module STRIC110 and transaction STRID110. The CPU Usage by DL/I Request report for PSB STRIC110 of module STRIC110 and transaction STRID110 will provide detail information for all DL/I requests.

Figure 3-3. DL/I CPU Summary Report for MPR Regions

```
                                        **DL/I CPU SUMMARY **

                                                        CPU TIME PERCENT      CPU TIME HISTOGRAM  MARGIN OF ERROR:  3.34%
TRANSACTION   MODULE     SECTION       PSB               SOLO     TOTAL       .00      14.500      29.00      43.50    76.00

STRID110    STRIC110     STRIC110     STRIC110          56.28    56.28       .****************************************+
STRID120    STRIC120     STRIC120     STRID120            .47      .58       .
STRID120    STRIC130     STRIC130     STRID130           2.33     2.33       .*
STRIM120    STRIC120     STRIC120     STRID120            .35      .35       .
                                                        -----    -----
TOTAL CPU ACTIVITY                                      59.42    60.23
```

The CPU Usage by DL/I Request report (Figure 3-4) provides detail information for each DL/I call and its parameter list within a transaction, module, section, and PSB.

The CPU Usage by DL/I Request report for transaction STRID110, module STRIC110, section STRIC110, and PSB STRIC110 shows that more than 43% of the CPU time for PSB STRIC110 was spent executing a Get Unique (GU) function call at program statement line number 118593, hexadecimal location +235C, reference number 2. If you look at the detail line for reference number 2, you will see that the PCB Type shows a database (DB) retrieval using PCB LON0001 and DBD STRIDLON to retrieve the CUSTROOT and LOANSEGM segments within the STRIDLON database.

Figure 3-4. CPU Usage by DL/I Request Report for MPR Regions

```
                                        ** CPU USAGE BY DL/I REQUEST **

TRANSACTION - STRID110
MODULE      - STRIC110
SECTION     - STRIC110
PSB         - STRIC110
                                                  CALL PARAMETERS

    REF       PSB    PSC NAME    RESOURCE
    NUMBER    TYPE   OR LABEL    NAME          SSA DATA

    000001    I/O    IOPCB
    000002    DB     LON00001   STRIDLON      CUSTROOT*D(CUSACTNO=????
                                              LOANSEGM*-LOANNO   =????
    000003    DB     CUS00001   STRIDCUS
    000004    I/O    IOPCB
    000005    DB     CUS00001   STRIDCUS      CUSTROOT*PD(CYXACTNO =????
                                                   CUSTADDR
                                                  FUNCTION ACTIVITY

            PROCEDURE   REQUEST      DL/I   REF.     CPU TIME PERCENT      CPU TIME   HISTOGRAM   MARGIN OF ERROR:  3.34%
LINE NO.    NAME        LOCATION     FUNC  NUMBER     SOLO    TOTAL        .00        11.00       22.00    33.00    44.00

 75400     CALL      00001602    GU    000001          .12     .12        .
118593     CALL      0000235C    GU    000002        42.44   43.14        .***************************************+
125800     P113-SEG  000024E8    GNP   000003          .35     .35        .
136994     CALL      000028AE    ISRT  000004          .12     .35        .
136994     CALL      000028AE    GU    000005        13.26   13.25        .************
                                                     -----   -----
TOTALS                                               56.28   56.98
```

In this example, STROBE created an index map file for module STRIC110 and used it when creating the STROBE Performance Profile to include the line number and procedure name.

You should examine the specified module logic, DL/I call, and its parameter list for the most efficient way to access the database. For example, when you refer to multiple SSAs in one call, include all the SSAs in the path to the segment. Omitting an SSA forces IMS to generate it during the execution of the call.

The following compiler output (Figure 3-5 on page 3-4) shows the DL/I call within the application program that was referenced in the CPU Usage by DL/I Request.

Figure 3-5. Compiler Output for Module STRIC110

```
118510 2010-GU-HDAM.
118520* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
118530* SET UP AND DO DATABASE CALLS AND PROCESS SCREEN               *
118540* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

118560     MOVE SSA1-DEDB-ROOT    TO SSA-LEVEL-1.                          17500 40000
118570     MOVE SSA-LOAN-SEGMENT  TO SSA-LEVEL-2.                          18700 41400
118580     MOVE INPUT-DB-ACCOUNT  TO OUT112-ACCT-NUMBER, SL1-NAME.         29300 34200 40900
118590     MOVE INPUT-LOAN        TO OUT112-LOAN-NUMBER, SL2-SUB.          30200 34300 42400
118591     MOVE 'D'               TO SL1-CC1.                              40300
118592*
118593      CALL 'CBLTDLI' USING GET-UNIQUE, LOAN-DB-PCB, LOAN-PATH,       EXT 2800 73300 48700
118594                     SSA-LEVEL-1, SSA-LEVEL-2.                       40000 41400
118595*
```

Identifying Wait Time in an MPR Region

The Wait Time by Module report (Figure 3-6 on page 3-5) shows all programs and subsystem service routines that were found to be in the wait state. If you specified the WAITLOC parameter when creating the STROBE Performance Profile, then the OFFSET column shows the location of page wait or other wait within each module.

In this example, more than 57% of the wait time was spent waiting for work in SVC 239, which is invoked by the IMS internal subsystem interface module DFSISI00. This is typical for MPR regions. No application programs show wait in this module, but the IMS system service modules show wait time that can be assigned to database I/O activity or DL/I call services. To investigate wait time attributed to IMS services for DL/I calls within your application programs, analyze the DL/I Wait Summary and Wait by DL/I Request reports.

Figure 3-6. Wait Time by Module Report for MPR Regions

```
                                         ** WAIT TIME BY MODULE **

MODULE    SECTION COMPRESSED   FUNCTION                    RUN TIME PERCENT     RUN TIME HISTOGRAM  MARGIN OF ERROR: 1.47%
 NAME      NAME     SECTION                                  PAGE     TOTAL     .00     14.50     29.00     43.50     58.00

.IMS      DBFDEDB0 DBFDEDB0 FP-DATA BASE ROUTINES             .00       .04     .
.IMS      DBFDEDB0 DBFDTCR0 FP-DATA BASE ROUTINES             .00       .09     .
.IMS      DBFDEDB0 DBFMCCV9 FP-COMMAND CODE VALIDATN          .00       .07     .
.IMS      DBFDEDB0 DBFMCTL0 FP-DEDB CHECK SEG. LEVE           .00       .04     .
.IMS      DBFDEDB0 DBFMGAP0 FP-GET ANCHOR POINT               .00       .07       .
.IMS      DBFDEDB0 DBFMLOP0 FP-DATA BASE ROUTINES             .00       .02       .
.IMS      DBFDEDB0 DBFMRQC0 FP-DEBD RETR. VIA QUA             .00       .05       .
.IMS      DBFDEDB0 DBFMSSG9 FP-SSA-HANDLER FOR GET            .00       .04       .
.IMS      DBFDEDB0 DBFXSL00 FP-DATA BASE ROUTINES             .00       .63       .
.IMS      DBFIRC10          FP-INTER-REGN COMM CNTLR          .00       .11       .
.IMS      DBFMSDB0          IMS SYSTEM SERVICES               .00       .13       .
.IMS      DBFSYNC0          FP-SYNC PROCESS CONTRLER          .00       .16       .
.IMS      DFSCPY00          DC-CTL, INTERREG COMM             .00       .02       .
.IMS      DFSDLA00          DB-CALL ANALYZER                  .00       .11       .
.IMS      DFSDLD00          DL/I LOGICAL DEL/REPLACE          .00       .07       .
.IMS      DFSDLOC0          DB-DATABASE OPEN/CLOSE            .00       .22       .
.IMS      DFSDVBH0 DFSDVBH0 DB-BUFFER HANDLER ROUTER          .00       .29       .
.IMS      DFSDVSM0 DFSDVSM0 DB-VSAM INTERFACE                 .00       .11       .
.IMS      DFSFXC30          DC-SYNC POINT                     .00       .02       .
.IMS      DFSFXC50          DB-DATABASE SYNC POINT            .00       .02       .
.IMS      DFSIAFP0          IMS SYSTEM SERVICES               .00       .02       .
.IMS      DFSISI00          DC-INTER SUBSYSTEM INTF           .00       .25       .
.IMS      DFSLMGR0          DB-GLOBAL LOCK MANAGER            .00       .07       .
.IMS      DFSLRH00          DB-LOCK REQUEST HANDLER           .00       .07       .
.IMS      DFSRDBL0          DB-DB CHANGE LOGGING              .00       .11       .
.IMS      DFSREP00 DFSREP00 DC-SCP SENSITVE DISPATCH          .00     12.15       .++++++++
.IMS      DFSSDL30          DC-SAS ROUTING ROUTINE            .00       .22       .
                                                             -----     -----
.IMS      TOTALS            IMS SYSTEM SERVICES               .00     15.20

.IRLM     DXRRLM10          IRLM                              .00       .04       .
.IRLM     DXRRLM60          IRLM                              .00       .22       .
                                                             -----     -----
.IRLM     TOTALS            RESOURCE LOCK MANAGER             .00       .26

.SVC      SVC 006           PROGRAM MANAGER/LINK              .00       .67       .
.SVC      SVC 008           PROGRAM MANAGER/LOAD              .00      2.95       .++
.SVC      SVC 018           BLDL/FIND                         .00      3.78       .++
.SVC      SVC 239           USER SVC                          .00     57.87       .+++++++++++++++++++++++++++++++++++++++
                                                             -----     -----
.SVC      TOTALS            SUPERVISOR CONTROL                .00     65.27
                                                             -----     -----
PROGRAM DFSRRC00 TOTALS                                       .00     80.73
```

The DL/I Wait Summary report (Figure 3-7) identifies the total wait time by transaction, module, section, and PSB name that initiated the request for IMS DL/I services.

In this example, more than 8% of the wait time was spent waiting in PSB STRIC130 of module STRIC130 and transaction STRID130. The Wait by DL/I Request report for PSB STRIC130 of module STRIC130 and transaction STRID130 provides detail information on all DL/I requests.

Figure 3-7. DL/I Wait Summary Report for MPR Regions

```
                                      **DL/I WAIT SUMMARY **


                                                        RUN TIME PERCENT       RUN TIME HISTOGRAM  MARGIN OF ERROR:  3.34%
TRANSACTION   MODULE     SECTION       PSB               SOLO     TOTAL        .00       2.50      5.00       7.50      10.00


STRID110    STRIC110               STRID110              .00      1.03       .++++
STRID120    STRIC120               STRID120              .00      4.01       .+++++++++++++++++
STRID130    STRIC130               STRIC130              .00      8.46       .++++++++++++++++++++++++++++++++++++
STRIM110    STRIL110               STRIL110              .00       .54       .++
STRIM120    STRIL120               STRID120              .00       .45       .+
STRIM130    STRIL130               STRID130              .00       .38       .+
                                                        -----     -----
TOTAL WAIT ACTIVITY                                      .00     14.86
```

The Wait by DL/I Request report (Figure 3-8 on page 3-6) provides detail information for each DL/I call and its parameter list within a transaction, module, section, and PSB.

The Wait by DL/I Request report for transaction STRID130, module STRIC130, and PSB STRIC130 shows that more than 7% of the time waiting in PSB STRIC130 was for a Get Unique (GU) function call at program location hexadecimal +1E0C, and the reference number is 2. If you look at the detail line for reference number 2, you will see that the PCB Type shows a database (DB) retrieval using PCB CUSPCB and DBD STRIDCUS to retrieve an entry from the CUSTROOT's CHCKSEGM segment within the STRIDCUS database.

You should examine the DL/I call, its parameter list, and the database hierarchy to determine the most efficient way to access the database to eliminate data structure conflicts. For example, you could create a secondary index so that the application program can access a particular segment by a field that is not the segment's key.

Figure 3-8. Wait by DL/I Request Report for MPR Regions

```
                                             ** WAIT BY DL/I REQUEST **

TRANSACTION - STRID130
MODULE      - STRIC130
SECTION     - STRIC130
PSB         - STRIC1300

                                                  CALL PARAMETERS

    REF      PCB   PCB NAME   RESOURCE
    NUMBER   TYPE  OR LABEL   NAME          SSA DATA

    000001   I/O    IOPCB
    000002   DB     CUSPCB   STRIDCUS       CUSTROOT(CUSACTNO = ????
                                            CHCKSEGM*L
    000003   DB     CUSPCB   STRIDCUS       CUSTROOT(CUSACTNO =????
                                            CHCKSEGM*-
    000004   I/O    IOPCB

                                                  FUNCTION ACTIVITY

            PROCEDURE   REQUEST    DL/I    REF.      CPU TIME PERCENT       CPU TIME HISTOGRAM  MARGIN OF ERROR:  3.33%
LINE NO.    NAME        LOCATION   FUNC    NUMBER     SOLO     TOTAL        .00       7.00      14.00      21.00      28.00

                        00001A3E   GU      000001      .00       .51        .++
                        00001E0C   GU      000002      .00      7.85        .++++++++++++++++++++++++++++++++++++
                        00001F3C   ISRT    000003      .00       .07        .
                        00001A3E   GU      000004      .00       .02        .
                                                      -----     -----
TOTALS                                                 .00      8.46
```

Identifying CPU Usage by Transaction in an MPR Region

Transaction reports show activity

- by transaction identifier or Fast Path routing code
- within each transaction, by module and control section

The Transaction Summary report (Figure 3-9 on page 3-7) shows the distribution of CPU time among transactions that were active during the measurement session. It also shows the number of times a transaction was executed during the measurement session, as well as the average service time of the transaction. For a list of items to consider when interpreting this information, see "Analyzing Service Time and Transaction Counts" on page 3-8.

In this example, transaction STRID110 was executed over 1,000 times and used over 90% of the CPU time consumed by the application program. The Transaction Usage by Control Section report for STRID110 provides a detailed breakdown of this activity.

Figure 3-9. Transaction Summary Report for MPR Regions

```
                                                ** TRANSACTION SUMMARY **
TRANSACTION    FUNCTION                    TRANSACTION   AVERAGE     % CPU TIME    CPU TIME HISTOGRAM  MARGIN OF ERROR:  6.07%
   NAME                                       COUNT      SERVICE     SOLO   TOTAL  .00       25.00      50.00      75.00    100.00
                                                         TIME
 STRID110                                       1090        1.65     90.81  91.86  .****************************************
 STRID120                                          2        0.67      1.74   1.86  .
 STRID130                                         17        2.98      3.60   3.60  .*
 STRIM110                                          1        1.08      1.05   1.05  .
 STRIM120                                          1        0.67       .81    .81  .
 STRIM130                                          1        1.77       .81    .81  .
                                               -----       -----     -----  -----
PROGRAM DFSRRC00 TOTALS                         1112        1.47     98.84 100.00
```

The Transaction Usage by Control Section report (Figure 3-10) shows, for each transaction that was active during the measurement session, the CPU time spent in each control section within each active module. The Transaction Usage by Control Section report for transaction STRID110 shows that most of the CPU time was used by the pseudo-module .IMS, with modules DFSDLA00 and DFSDLR00, each accounting for more than 11% of the CPU time. The Attribution of CPU Execution Time reports for these modules provide information about the transactions that invoked these system routines.

Figure 3-10. Transaction Usage by Control Section Report for MPR Regions

```
                                        ** TRANSACTION USAGE BY CONTROL SECTION **


TRANSACTION STRID110

MODULE   SECTION                                         CPU TIME  PERCENT      CPU TIME HISTOGRAM  MARGIN OF ERROR:  3.34%
NAME     NAME    COMPRESSED    FUNCTION                  SOLO      TOTAL      .00       3.50      7.00      10.50      14.00

 .COBLIB  IGZCPAC  IGZCLNK  LINKAGE MANAGER-DYNAMIC          4.41      4.41        .************
 .COBLIB  IGZCPAC  IGZCSCH  BINARY SEARCH OF TABLE            .12       .12        .
 .IMS     DBFDEDB0 DBFCMP10 FP-DATA BASE ROUTINES            1.40      1.40        .****
 .IMS     DBFDEDB0 DBFMCCV9 FP-COMMAND CODE VALIDATN          .93       .93        .**
 .IMS     DBFDEDB0 DBFMCLX0 FP-CALL ANALYZER                  .70       .70        .**
 .IMS     DBFDEDB0 DBFMCTL0 FP-DEDB CHECK SEG.LEVE           1.05      1.05        .**
 .IMS     DBFDEDB0 DBFMGAP0 FP-GET ANCHOR POINT               .12       .12        .
 .IMS     DBFDEDB0 DBFMLOP0 FP-DATA BASE ROUTINES             .23       .23        .
 .IMS     DBFDEDB0 DBFMPUG0 FP-DATA BASE ROUTINES             .12       .12        .
 .IMS     DBFDEDB0 DBFMRQC0 FP-DEDB RETR. VIA. QUA           1.86      1.86        .****
 .IMS     DBFDEDB0 DBFMSEG0 FP-DATA BASE ROUTINES             .81       .81        .**
 .IMS     DBFDEDB0 DBFMSFI9 FP-DATA BASE ROUTINES            1.00      1.00        .***
 .IMS     DBFDEDB0 DBFMSF09 FP-DATA BASE ROUTINES             .35       .35        .*
 .IMS     DBFDEDB0 DBFMSSC9 FP-SSA-HNDLR COMM GET/IN          .47       .47        .*
 .IMS     DBFDEDB0 DBFMVSN9 FP-VERIFY SEGMENT NAME           1.51      1.51        .****
 .IMS     DBFDEDB0 DBFPUXR0 FP-DATA BASE ROUTINES             .12       .12        .
 .IMS     DBFIRC10 DBFIRC10 FP-INTER-REGN COMM CNTLR         2.56      2.56        .*******
 .IMS     DFSCPY00 DFSCPY30 DC-SSA AND IO AREA MOVE          2.56      2.56        .*******
 .IMS     DFSDLA00 DFSDLAS0 DB-ANALYZE/PROCESS SSA           4.77      4.77        .*************+
 .IMS     DFSDLA00 DFSDLA00 DB-CALL ANALYZER                 8.72      8.84        .************************+
 .IMS     DFSDLR00 DFSDFR00 DB-LOGICAL RETRIEVE             11.74     11.98        .*********************************+
 .IMS     DFSDVBH0 DFSDVBH0 DB-BUFFER HANDLER ROUTER         3.26      3.49        .*********
 .IMS     DFSDVSM0 DFSDVSM0 DB-VSAM INTERFACE                7.33      7.56        .********************+
 .IMS     DFSECP10          DC-CTL, MPP ENV. CONTROL          .47       .47        .*
 .IMS     DFSISI00 DFSISI00 DC-INTER SUBSYSTEM INTF          3.72      3.72        .**********
 .IMS     DFSLI000          DB-LANGUAGE INTERFACE             .93       .93        .**
 .IMS     DFSREP00 DFSREP00 DC-SCP SENSITVE DISPATCH         4.07      4.07        .************
 .IMS     DFSTRA10          DB-INTERCEPT TRACE ENTRY          .12       .12        .
 .PRIVATE                   PRIVATE AREA                      .23       .23        .
 .SVC     SVC 008           PROGRAM MANAGER/LOAD              .23       .23        .
 .VSAM    IDA019L1          VSAM RECORD MANAGEMENT          12.91     13.14        .************************************+
 .VSAM    IDA019R0          VSAM                              .93       .93        .**
 STRIC110                                                    1.63      1.63        .****
                                                            -----     -----
                                                            90.82     91.86
```

Analyzing Service Time and Transaction Counts

This section describes the considerations for interpreting the service time and transaction count information that may appear on the Transaction Summary report (Figure 3-9 on page 3-7).

General Considerations

The following considerations apply to both the measuring of service time and the collection of transaction counts.

- STROBE does not collect service times and transaction counts in IFP regions.
- STROBE does not collect service times and transaction counts until sampling has begun.

Considerations for Service Time

For IMS regions, service time is the elapsed time between the end of the successful Get Unique to the IOPCB and the end of the last DL/I call. Therefore, the "Scheduling End to First Call" entry on the IMS monitor "Programs by Region" report is not included as service time. Also, the elapsed time from the end of the last call to the program return for that transaction is not included as service time.

STROBE stops collecting service time for a transaction when the measurement session ends. If a transaction has not issued another Get Unique to IOPCB when the measurement session ends, the reported service time for the transaction may be less than the actual service time for that occurrence of the transaction.

STROBE reports service time rounded to the nearest hundreth of a second. However, the IMS Monitor reports service time in units of .000001 seconds. For comparison of STROBE values with IMS Monitor "Programs by Region" report values, the STROBE value should be comparable to "Elapsed Execution Time - Mean" value.

Considerations for Transaction Counts

If a transaction is already in process when sampling begins (that is, the Get Unique to IOPCB has already occurred), the transaction is not included in transaction counts and service times.

Attribution of CPU Execution Time

The Attribution reports for modules DFSDLA00 and DFSDLR00 (Figure 3-11 on page 3-9) show that execution is concentrated in one or two DL/I calls. You should examine these routines and determine what they do within the IMS system and whether they are being called efficiently. (For a description of this report, see “The Attribution of CPU Execution Time Report for IMS Environments” on page 1-13.)

To investigate CPU time attributed to these modules from the DL/I calls within the application program, analyze the DL/I CPU Summary and CPU Usage by DL/I Request reports.

Figure 3-11. Attribution of CPU Execution Time Reports for MPR Regions

```
                                        ** ATTRIBUTION OF CPU EXECUTION TIME **

.IMS     DFSDLA00 DFSDLAS0  DB-ANALYZE/PROCESS SSA
-------------------------WAS INVOKED BY----------------------   -----------------VIA------------------------  CPU TIME %
XACTION    MODULE   SECTION  RETURN   LINE   PROCEDURE NAME    MODULE    SECTION    FUNCTION                  SOLO  TOTAL

STRID110 STRIC110         00235C  118593    CALL        DFSCPY00  DFSCPY00  DC-CTL, INTERREG COMM             4.77  4.77
                                                                                                              ----- -----
                                                                                                              4.77  4.77


.IMS       DFSDLA00 DFSDLA00  DB-CALL ANALYZER
-------------------------WAS INVOKED BY----------------------   -----------------VIA------------------------  CPU TIME %
XACTION    MODULE   SECTION  RETURN   LINE   PROCEDURE NAME    MODULE    SECTION    FUNCTION                  SOLO  TOTAL

STRID110 STRIC110         00235C  118593    CALL        DFSCPY00  DFSCPY00  DC-CTL, INTERREG COMM             8.72  8.84
                                                                                                              ----- -----
                                                                                                              8.72  8.84


.IMS       DFSDLR00 DFSDLR00  DB-LOGICAL RETRIEVE
-------------------------WAS INVOKED BY----------------------   -----------------VIA------------------------  CPU TIME %
XACTION    MODULE   SECTION  RETURN   LINE   PROCEDURE NAME    MODULE    SECTION    FUNCTION                  SOLO  TOTAL

STRID110 STRIC110         00235C  118593    CALL        DFSCPY00  DFSCPY00  DC-CTL, INTERREG COMM            11.74 11.98
                                                                                                              ----- -----
                                                                                                             11.74 11.98
```

Attribution of CPU Wait Time

The Attribution of CPU Wait Time report for pseudo-module .IMS (Figure 3-12) shows that in transaction STRID130, the DL/I service call at +1E0C is responsible for more than 6% of the total wait time. To investigate wait time attributed to this module from the DL/I call within the application program, analyze the DL/I Wait Summary and Wait by DL/I Request reports.

Figure 3-12. Attribution of CPU Wait Time Report for MPR Regions

```
                                        ** ATTRIBUTION OF CPU WAIT TIME **

.IMS     DFSREP00 DFSREP00  DC-SCP SENSITVE DISPATCH
--------------------------WAS INVOKED BY---------------------   -----------------VIA----------------------- WAIT TIME %
XACTION  MODULE   SECTION    RETURN   LINE   PROCEDURE NAME      MODULE   SECTION  FUNCTION                 PAGE  TOTAL

STRID110 STRIC110 STRIC110   0016D2  75400      CALL             DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .38
STRID110 STRIC110 STRIC110   002768 134100      CALL             DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .11
STRID110 STRIC110 STRIC110   00290E 138600   TERM-OUT2-RTN       DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .20
STRID120 STRIC120 STRIC120   002016                              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .31
STRID120 STRIC120 STRIC120   00247E                              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00  2.10
STRID120 STRIC120 STRIC120   0026AE                              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .83
STRID120 STRIC120 STRIC120   0037E2                              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .13
STRID130 STRIC130 STRIC130   001A3E                              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .07
STRID130 STRIC130 STRIC130   001E0C                              DBFIRC10 DBFIRC10 FP-INTER-REGN COMM CNTLR  .00  6.69
STRID130 STRIC130 STRIC130   0022B8                              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .02
STRIM110 STRIL110 STRIL110   00125C                              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .09
STRIM110 STRIL110 STRIL110   002C40                              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .18
STRIM110 STRIL110 STRIL110   003A70                              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .25
STRIM120 STRIL120 STRIL120   00163A                              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .11
STRIM120 STRIL120 STRIL120   00497C                              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .36
STRIM130 STRIL130 STRIL130   000C8C                              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .04
STRIM130 STRIL130 STRIL130   0023B8                              DFSCPY00 DFSCPY00 DC-CTL, INTERREG COMM     .00   .27
                                                                                                            ----- -----
                                                                                                              .00 12.15
```

Analyzing the Reports for a DL/I Batch Processing Region

The Measurement Session Data report for a DL/I batch processing application shows the identifier “DLB” in the SUBSYSTEM field and the name of the application in the IMS APPLICATION field (Figure 3-13).

Figure 3-13. Measurement Session Data Report for Batch Regions

```
                                          ** MEASUREMENT SESSION DATA **

-------- JOB ENVIRONMENT --------      ------- MEASUREMENT PARAMETERS ------       ----- MEASUREMENT STATISTICS ----

PROGRAM MEASURED   -    DFSRRC00      ESTIMATED SESSION TIME  -      1 MIN        CPS TIME PERCENT -          16.82
JOB NAME           -      WPADL2      TARGET SAMPLE SIZE      -     15,000        WAIT TIME PERCENT -         83.18
JOB NUMBER         -    JOB02352      REQUEST NUMBER     (Q)  -        589        RUN MARGIN OF ERROR PCT  -    .96
STEP NAME   -                  G                                                  CPU MARGIN OF ERROR PCT  -   1.36
                                      OPTIONS -  IMS
DATE OF SESSION    -  03/15/1998                                                  TOTAL SAMPLES TAKEN -       5,159
TIME OF SESSION    -    14:52:03      --------- REPORT PARAMETERS ---------       TOTAL SAMPLES PROCESSED -   5,159
CONDITION CODE     -      C-0000                                                  INITIAL SAMPLING RATE- 250.00/SEC
                                      REPORT RESOLUTION    -       64 BYTES       FINAL SAMPLING RATE  - 250.00/SEC
SYSTEM -             ESA SP4.3.0      LINES/PAGE           -             60
DFSMS              -       1.2.0                                                  SESSION TIME -    9 MIN 14.60 SEC
SUBSYSTEM   -        IMS DLB 4.1                                                  CPU TIME -        0 MIN 11.56 SEC
IMS APPLICATION    -    IMSCUST1      NODASD  ATTR= 0.0%                          WAIT TIME    -    0 MIN 57.10 SEC
CPU MODEL          -   3090-600S                                                  STRETCH TIME -    8 MIN  5.94 SEC
SMF/SYSTEM ID -      MVST/TLP002      DATE FORMAT                   MM/DD/YYYY
                                      TIME FORMAT (24 HOURS)          HH:MM:SS    SRB TIME     -    0 MIN  0.62 SEC
REGION SIZE BELOW 16M  -  4,160K                                                  SERVICE UNITS-              19119
REGION SIZE ABOVE  -     32,768K
                                                                                  PAGES IN-  6,411     OUT-   2,017
PTF LVL- 2.2.1.FS000000/FS000000                                                  PAGING RATE  -         15.20/SEC
STROBE TAPE NUMBER -  000-S00DSK                                                  EXCPS -     262         0.47/SEC


SAMPLE DATA SET  - WPAJJN.IMSV4R1.WPADLD2.S001D001
```

Analyzing Batch DL/I Applications

To analyze a batch DL/I application's CPU usage, begin with the Program Section Usage Summary report. To analyze the application’s wait time, begin with the Wait Time by Module report. Because the program’s CPS TIME PERCENT in Figure 3-13 was almost 17%, start by examining the CPU reports.

The Program Section Usage Summary report for a batch region (Figure 3-14 on page 3-11) shows the activity of each program module that was active during the measurement session. If STROBE has obtained module mapping data, the report shows control sections within modules.

Figure 3-14. Program Section Usage Summary Report for Batch Regions

```
                                       ** PROGRAM SECTION USAGE SUMMARY **

 MODULE  SECTION 16M   SECT  FUNCTION                   CPU TIME PERCENT      CPU TIME HISTOGRAM  MARGIN OF ERROR:  3.33%
   NAME  NAME    <,>   SIZE                              SOLO     TOTAL       .00      11.00      22.00      33.00     44.00

.SYSTEM  .COMMON             COMMON AREA                1.38      1.38       .*
.SYSTEM  .IMS                SUPERVISORY FUNCTIONS     41.59     42.63       .************************************+
.SYSTEM  .IOCS               DATA MANAGEMENT SERVICES   1.15      1.15       .*
.SYSTEM  .IRLM               RESOURCE LOCK MANAGER       .58       .58       .
.SYSTEM  .PL/ILIB            PL/I LIBRARY SUBROUTINES    .12       .12       .
.SYSTEM  .SVC                SUPERVISOR CONTROL        11.87     11.87       .**********
.SYSTEM  .VSAM               VIRTUAL STORAGE ACC METH  38.02     39.06       .*********************************+
                                                       -----     -----
.SYSTEM  TOTALS              SYSTEM SERVICES           94.71     96.79

CSVXCTL          >     1032  CONTENTS SUPERVISION        .35       .35       .
IGC0004B         >     7688  SUPERVISOR SERVICES         .12       .12       .

STRIL140 .PL/ILIB     10577  PL/I LIBRARY SUBROUTINES   2.53      2.53       .**
STRIL140 ***L1401 >     628                              .23       .23       .
                                                       -----     -----
STRIL140 TOTALS       11205                             2.76      2.76
                                                       -----     -----
PROGRAM DFSRRC00 TOTALS                                97.93    100.00
```

In this example, more than 42% of the CPU time was spent executing IMS system service modules. To reduce CPU time used by IMS DL/I services for your application programs, analyze the DL/I CPU Summary and CPU Usage by DL/I Request reports.

To determine which IMS system service modules were responsible for most of this activity, see the Program Usage by Procedure report (Figure 3-18 on page 3-13) for pseudo-module .IMS.

The DL/I CPU Summary report (Figure 3-15) identifies the total CPU time by the module, section, and PSB name that initiated the request for IMS DL/I services.

In this example, more than 29% of the CPU time was spent executing PSB STRIL140 of module STRIL140. The CPU Usage by DL/I Request report for PSB STRIL140 of module STRIL140 provides detail information for all DL/I requests.

Figure 3-15. DL/I CPU Summary Report for Batch Regions

```
                                    ** DL/I CPU SUMMARY **

                                                      CPU TIME PERCENT      CPU TIME HISTOGRAM  MARGIN OF ERROR:  3.33%
MODULE       SECTION      PSB                          SOLO     TOTAL       .00       7.50      15.00      22.50     30.00

STRIL140     ***L1401     STRIL140                    28.69     29.72       .*************************************+
                                                      -----     -----
TOTAL CPU ACTIVITY                                    28.69     29.72
```

Identifying CPU Usage in Batch Regions

The CPU Usage by DL/I Request report (Figure 3-16 on page 3-12) for module STRIL140 and PSB STRIL140 shows that more than 27% of the CPU time for PSB STRIL140 was spent executing a Get Hold Unique (GHU) function call at program statement line number 17, hexadecimal location +1CC. It also shows that the reference number is 1. The detail line for reference number 1 shows that the PCB Type shows a database retrieval using PCB LOANPCB and DBD STRIDLON to retrieve and hold a segment from the STRIDLON database. There is no SSA, meaning that this was an unqualified call.

Figure 3-16. CPU Usage by DL/I Request Report for Batch Regions

```
                                                 ** CPU USAGE BY DL/I REQUEST **

MODULE       - STRIL140
SECTION      - ***L1401
PCB          - STRIL140
                                                      CALL PARAMETERS

    REF       PCB   PCB NAME    RESOURCE
    NUMBER    TYPE  OR LABEL    NAME          SSA DATA

    000001    DB    LOANPCB     STRIDLON
    000002    DB    LOANPCB     STRIDLON
                                                      FUNCTION ACTIVITY

            PROCEDURE    REQUEST     DL/I    REF.      CPU TIME PERCENT       CPU TIME HISTOGRAM  MARGIN OF ERROR:  3.33%
LINE NO.    NAME         LOCATION    FUNC    NUMBER     SOLO      TOTAL       .00       7.00      14.00      21.00      28.00

    17      CALL         000001CC    GHU     000001    26.04     27.07        .************************************+
    19      CALL         00000256    GHN     000002     2.65      2.65        .***
                                                       -----     -----
TOTALS                                                 28.69     29.72
```

To provide line number and procedure name for activity shown in module STRIL140, the map file for the module was specified as an input file when the STROBE Performance Profile was created. Figure 3-17 shows the source code for lines 17-19, which were responsible for all the detected activity. Examine the specified module logic, the DL/I call, and its parameter list for the most efficient way to access the database. For example, you can reduce the number of DL/I calls issued in the program by using SSAs to locate a particular segment. The following compiler output (Figure 3-17) shows the DL/I call within the application program that was referenced in the CPU Usage by DL/I Request and Wait by DL/I Request report examples.

Figure 3-17. Compiler Output for Module STRIL140

```
17    1  1      CALL PLITDLI   ( THREE,
                                 GHU,
                                 DB_PCB_LON_PTR,
                                 LON_PATH);
18    1  1      PUT SKIP LIST ( LON_STATUS );
19    1  1      CALL PLITDLI   ( THREE,
                                 GHN,
                                 DB_PCB_LON_PTR,
                                 LON_PATH);
```

The Program Usage by Procedure report shows the actual names of all modules within the pseudo-modules. If control section mapping data was available, the report shows control sections within modules. The report also displays function descriptors for the control section or the module.

The example for pseudo-module .IMS in Figure 3-18 on page 3-13 shows that control section DFSDVSM0 in module DFSDVSM0 (a system service module controlling the database-VSAM interface) was responsible for more than 16% of the CPU activity used by IMS system services. To determine which modules invoked this service module, see the Attribution of CPU Execution Time reports (Figure 3-19 on page 3-13).

Figure 3-18. Program Usage by Procedure Report for Batch Regions

```
                                      ** PROGRAM USAGE BY PROCEDURE **

         .SYSTEM   SYSTEM SERVICES                      .IMS      SUPERVISORY FUNCTIONS

MODULE   SECTION        FUNCTION           INTERVAL  CPU TIME PERCENT       CPU TIME HISTOGRAM  MARGIN OF ERROR:  3.33%
  NAME     NAME                              LENGTH PAGE       TOTAL        .00       4.50      9.00      13.50     18.00

DFSBC000           DB-CONTROL BLOCK SERVICE    43192    .23       .23       .
DFSDLA00           DB-CALL ANALYZER            25304   1.73      1.73       .***
DFSDLBN0           DL/I CALL TRACE             26336    .23       .23       .
DFSDLR00 DFSDLR00  DB-LOGICAL RETRIEVE         43200   8.41      8.41       .******************
DFSDVBH0 DFSDVBH0  DB-BUFFER HANDLER ROUTER    15312   3.92      4.03       .********
DFSDVSM0 DFSDVSM0  DB-VSAM INTERFACE           30544  15.55     16.01       .**********************************+
DFSKBDP0 DFSKBDP0  DB-IMS BATCH DISPATCHING     2240   9.79     10.25       .*********************+
DFSLMGR0           DB-GLOBAL LOCK MANAGER      18352    .12       .12       .
DFSPCC30           DB-BATCH APPL PRGM CNTRL     6960    .12       .12       .
DFSPLDR0           DB-MODULE PRELOAD DRIVER     1888    .12       .12       .
DFSPLPP0           DB-MOD. PRELOAD, PROCLIB     1736    .12       .12       .
DFSPR000           DB-CTL, BATCH PROG REQ       2944   1.15      1.15       .**
DFSXBAT0           DB-BATCH ITASK INITLZ       17952    .12       .12       .
                                                      -----     -----
         .IMS      TOTALS                             41.61     42.64
```

Attribution of CPU Execution Time

The Attribution of CPU Execution Time reports in Figure 3-19 show that control section DFSDVSM0 of module DFSDVSM0 accounts for over 13% of the CPU time attributed to IMS supervisory modules, while control section DFSKBDP0 of module DFSKBDP0 accounts for almost 5% of the CPU time. You should examine the code that calls these service routines to determine whether any performance improvement opportunities exist. (For a description of these reports, see “The Attribution of CPU Execution Time Report for IMS Environments” on page 1-13.)

Figure 3-19. Attribution of CPU Execution Time Reports for Batch Regions

```
                                   ** ATTRIBUTION OF CPU EXECUTION TIME **

.IMS     DFSDVSM0 DFSDVSM0  DB-VSAM INTERFACE
---------------------------WAS INVOKED BY---------------------   -----------------VIA-----------------------  CPU TIME %
XACTION  MODULE   SECTION    RETURN   LINE   PROCEDURE NAME      MODULE   SECTION  FUNCTION                  SOLO  TOTAL

         STRIL140 ***L1401   0001CC    17       LOANCALC         DFSPR000          DB-CTL, BATCH PROG REQ   12.33 12.79
         STRIL140 ***L1401   000256    19       LOANCALC         DFSPR000          DB-CTL, BATCH PROG REQ     .46   .46
                                                                                                            ----- -----
                                                                                                            12.79 13.25

.IMS     DFSKBDP0 DFSKBDP0  DB-IMS BATCH DISPATCHING
---------------------------WAS INVOKED BY---------------------   -----------------VIA-----------------------  CPU TIME %
XACTION  MODULE   SECTION    RETURN   LINE   PROCEDURE NAME      MODULE   SECTION  FUNCTION                  SOLO  TOTAL

         STRIL140 ***L1401   0001CC    17       LOANCALC         DFSPR000          DB-CTL, BATCH PROG REQ    4.26  4.72
                                                                                                            ----- -----
                                                                                                             4.26  4.72
```

Identifying Wait Time in Batch Regions

The Wait Time by Module report (Figure 3-20 on page 3-14) shows all programs and subsystem service routines that were found to be in the wait state. If you specified the WAITLOC parameter when you created the STROBE Performance Profile, then the OFFSET column also shows the location of page wait or other wait within each module.

Figure 3-20. Wait Time by Module Report for Batch Regions

```
                                          ** WAIT TIME BY MODULE **

 MODULE   SECTION COMPRESSED   FUNCTION                    RUN TIME PERCENT      RUN TIME HISTOGRAM  MARGIN OF ERROR: 1.36%
  NAME      NAME    SECTION                                  PAGE     TOTAL      .00      15.00     30.00     45.00    60.00

 .COMMON  .COMMON           COMMON AREA                       .50       .79      .

 .IMS     DFSBNUC0          BATCH NUCLEUS                     .02       .02      .
 .IMS     DFSDLA00          DB-CALL ANALYZER                 1.10      1.10      .
 .IMS     DFSDLR00 DFSDLR00 DB-LOGICAL RETRIEVE              4.61      4.65      .***
 .IMS     DFSDVBH0 DFSDVBH0 DB-BUFFER HANDLER ROUTER          .37       .37      .
 .IMS     DFSDVSM0 DFSDVSM0 DB-VSAM INTERFACE                 .78       .81      .
 .IMS     DFSKBDP0 DFSKBDP0 DB-IMS BATCH DISPATCHING         4.13     59.59      .**++++++++++++++++++++++++++++++++++
 .IMS     DFSPR000          DB-CTL, BATCH PROG REQ            .37       .37      .
 .IMS     DFSXBAT0          DB-BATCH ITASK INITLZ             .12       .51      .
                                                            -----     -----
 .IMS     TOTALS            SUPERVISORY FUNCTIONS           11.50     67.42

 .IOCS    IGG019DJ          SAM INTERFACE QSAM                .56       .56      .
 .IRLM    DXRRLM60          IRLM                              .00       .10      .

 .PL/ILIB IBMBLIIA IBMBERR1 PL/I LIBRARY SUBROUTINES          .16       .16      .
 .PL/ILIB IBMBSTVA          STREAM I/O PRINT                  .14       .14      .
 .PL/ILIB STRIL140 ***11401 PL/I LIBRARY SUBROUTINES         1.43      1.43      .
                                                            -----     -----
 .PL/ILIB TOTALS            PL/I LIBRARY SUBROUTINES         1.73      1.73

 .SVC     SVC 006           PROGRAM MANAGER/LINK              .00       .56      .
 .SVC     SVC 008           PROGRAM MANAGER/LOAD              .00      1.22      .
 .SVC     SVC 018           BLDL/FIND                         .00      5.95      .+++
 .SVC     SVC 019           OPEN                              .00       .25      .
 .SVC     SVC 022           OPEN (TYPE = J)                   .00       .14      .
 .SVC     SVC 026           CATALOG MANAGEMENT                .00       .62      .
 .SVC     SVC 056           RESOURCE MANAGER/ENQUEUE          .00       .21      .
 .SVC     SVC 122           EXT.SVC ROUTER-TYPE 2             .00       .02      .
 .SVC     SVC 130           RACHECK                           .00       .04      .
 .SVC     SVC 236           USER SVC                          .00      2.81      .+
                                                            -----     -----
 .SVC     TOTALS            SUPERVISOR CONTROL                .00     11.82

 .VSAM    IDA019L1          VSAM RECORD MANAGEMENT            .60       .70      .
 STRIL140 ***L1401                                            .06       .06      .
                                                            -----     -----
PROGRAM DFSRRC00 TOTALS                                     14.95     83.18
```

In this example, more than 67% of the wait time was spent waiting on the IMS system service modules, which can be attributed to database I/O activity or DL/I call services. To investigate wait time attributed to IMS services for DL/I calls within your application programs, analyze the DL/I Wait Summary (Figure 3-21) and Wait by DL/I Request reports (Figure 3-22 on page 3-15). Almost all the IMS system wait time is assigned to the batch dispatching module DFSKBDP0. This concentration is normal for a batch IMS environment, because database I/O contributes heavily to wait time. To determine which modules invoked this service module, see the Attribution of CPU Wait Time report (Figure 3-23 on page 3-15).

The DL/I Wait Summary report (Figure 3-21) identifies the total wait time by the transaction, module, section, and PSB name that initiated the request for IMS DL/I services.

In this example, more than 58% of the wait time was spent waiting in PSB STRIL140 of module STRIL140. The Wait by DL/I Request report for PSB STRIL140 of module STRIL140 provides detail information for all DL/I requests.

Figure 3-21. DL/I Wait Summary Report for Batch Regions

```
                                     ** DL/I WAIT SUMMARY **


                                                           RUN TIME PERCENT      RUN TIME HISTOGRAM  MARGIN OF ERROR:  3.33%
 MODULE       SECTION      PSB                               PAGE     TOTAL      .00      15.00     30.00     45.00     60.00

 STRIL140     ***L1401     STRIL140                          4.77     58.77      .***++++++++++++++++++++++++++++++++++++++
                                                            -----     -----
 TOTAL WAIT ACTIVITY                                         4.77     58.77
```

The Wait by DL/I Request report for module STRIL140 and PSB STRIL140 (Figure 3-22) shows that more than 57% of the time waiting in PSB STRIL140 was for a Get Hold Unique (GHU) function call at program statement line number 17, hexadecimal location +1CC. It also shows that the reference number is 1. If you look at the detail line for reference number 1, you see that the PCB Type shows a database retrieval using PCB LOANPCB and DBD STRIDLON to retrieve and hold an entry from the STRIDLON database.

To provide the line number and the procedure name for activity shown in module STRIL140, the map data set for the module was included when the STROBE Performance Profile was created. The map data set is the repository for the information STROBE uses to relate addresses in the object module with procedures or statements in the source program. You can create a map data set with STROBE/ISPF, or by using cataloged procedures. For more information on creating a map data set, see the *STROBE MVS User's Guide*. Figure 3-17 on page 3-12 shows the source code for lines 17-19, which were responsible for all the detected activity.

You should examine the specified module logic, DL/I call, and its parameter list for the most efficient way to access the data.

Figure 3-22. Wait by DL/I Request Report for Batch Regions

```
                                          ** WAIT BY DL/I REQUEST **

MODULE      - STRIL140
SECTION     - ***L1401
PSB         - STRIL140
                                              CALL PARAMETERS

    REF      PCB   PCB NAME   RESOURCE
    NUMBER   TYPE  OR LABEL   NAME          SSA DATA

    000001   DB    LOANPCB    STRIDLON
    000002   DB    LOANPCB    STRIDLON
                                              FUNCTION ACTIVITY

            PROCEDURE   REQUEST     DL/I    REF.      CPU TIME PERCENT      CPU TIME HISTOGRAM  MARGIN OF ERROR:  3.33%
LINE NO.    NAME        LOCATION    FUNC    NUMBER     PAGE      TOTAL      .00      14.50      29.00      43.50      58.00

    17      CALL        000001CC    GHU     000001     3.39      57.39      .**++++++++++++++++++++++++++++++++++++
    19      CALL        00000256    GHN     000002     1.40       1.40      .
                                                      -----      -----
TOTALS                                                 4.79      58.79
```

Attribution of CPU Wait Time

The Attribution of CPU Wait Time report (Figure 3-23) identifies the location in the calling module that invoked a system service routine. In this example, control section DFSKBDP0 of module DFSKBDP0 shows wait resulting from one DL/I request by module STRIL140. (For a description of this report, see "The Attribution of CPU Execution Time Report for IMS Environments" on page 1-13.) Note also that if the wait time is the result of I/O, the ddname is shown in the SECTION column under VIA.

Figure 3-23. Attribution of CPU Wait Time Report for Batch Regions

```
                                        ** ATTRIBUTION OF CPU WAIT TIME **

.IMS     DFSKBDP0 DFSKBDP0  DB-IMS BATCH DISPATCHING
---------------------------WAS INVOKED BY---------------------   -----------------VIA----------------------- WAIT TIME %
XACTION  MODULE   SECTION    RETURN   LINE   PROCEDURE NAME       MODULE   SECTION  FUNCTION                  PAGE  TOTAL

         STRIL140 ***L1401   0001CC     17      CALL              DFSPR000          DB-CTL, BATCH PROG REQ    1.90 44.21
         STRIL140 ***L1401   0001CC     17      CALL              DFSPR000 STRIDLON DB-CTL, BATCH PROG REQ     .00 10.95
                                                                                                             ----- -----
                                                                                                              1.90 55.17
```

Chapter 4.
The STROBE Performance Profile for CICS/DBCTL Regions

This chapter shows a sample STROBE Performance Profile from a CICS/DBCTL environment. For information about Profiles produced in a DL/I or batch region, see Chapter 3, "The STROBE Performance Profile for Dependent Regions". For information about Profiles produced in an IMS control region or DL/I Separate Address Space, see Chapter 5, "The STROBE Performance Profile for IMS Supervisory Regions".

If your installation has the STROBE CICS Feature, and you have produced the CICS Performance Supplement, the transaction reports in the supplement contain all the CICS/DBCTL data. Otherwise, STROBE formats the data according to the standard transaction report format. For additional information on producing the CICS Performance Supplement, see the STROBE *STROBE CICS Feature*.

In a CICS/DBCTL environment, attribution

- identifies the four-character transaction code of the CICS task associated with a DBCTL thread
- identifies the modules executing under the control of the threads (these modules implement DL/I services)
- reports the displacement within the application module that issued the DL/I service request

Analyzing the Reports from a CICS/DBCTL Environment

The Measurement Session Data report (Figure 4-1 on page 4-2) describes the environment during a measurement session. When STROBE measures a job step executing in a CICS region, the report shows in the SUBSYSTEM field the version and release number of CICS, the region identifier DBC to show that this CICS region is connected to IMS DBCTL, and the IMS version and release number.

Figure 4-1. Measurement Session Data Report for CICS/CBCTL Region

```
                                       ** MEASUREMENT SESSION DATA **

-------- JOB ENVIRONMENT --------      ------- MEASUREMENT PARAMETERS ------        ----- MEASUREMENT STATISTICS ----

 PROGRAM MEASURED   -      DFHSIP      ESTIMATED SESSION TIME  -       3 MIN        CPS TIME PERCENT -          14.48
 JOB NAME           -    WPACI330      TARGET SAMPLE SIZE      -      10,000        WAIT TIME PERCENT -         85.52
 JOB NUMBER         -    STC04167      REQUEST NUMBER     (A)  -         637        RUN MARGIN OF ERROR PCT  -    .98
 STEP NAME   -           WPACI330      FINAL SESSION ACTION    -        QUIT        CPU MARGIN OF ERROR PCT  -   1.08

 DATE OF SESSION    -  06/12/1998      MODULE MAPPING BASELINE -           2        TOTAL SAMPLES TAKEN -      10,000
 TIME OF SESSION    -    09:07:28      BASELINE OVERRIDE -  DLIASM1  CLIASM1        TOTAL SAMPLES PROCESSED -  10,000
 CONDITION CODE     -      C-0000         CLIPLI1  DLIPLI1  CLICO21  DLICO21        INITIAL SAMPLING RATE-  55.56/SEC
                                                                                    FINAL SAMPLING RATE  -  55.56/SEC
 SYSTEM -            ESA SP5.2.0
 DFSMS             -        1.2.0      --------- REPORT PARAMETERS ---------        SESSION TIME -    5 MIN  7.38 SEC
 SUBSYSTEM         -     CICS 3.3                                                   CPU TIME -        0 MIN 20.25 SEC
                          DBC 4.1      REPORT RESOLUTION     -      64 BYTES        WAIT TIME    -    1 MIN 59.47 SEC
 CPU MODEL          -   3090-300S      LINES/PAGE            -            60        STRETCH TIME -    2 MIN 47.66 SEC
 SMF/SYSTEM ID -      MVST/TLP003
                                                                                    SRB TIME     -    0 MIN  0.36 SEC
 REGION SIZE BELOW 16M  -  6,208K      NODASD  ATTR= 0.0%                           SERVICE UNITS-              22909
 REGION SIZE ABOVE  -     32,768K
                                       DATE FORMAT                MM/DD/YYYY        PAGES IN-      0     OUT-       0
 PTF LVL- 2.2.1.FS000000/FS000000      TIME FORMAT (24 HOURS)       HH:MM:SS        PAGING RATE  -           0.00/SEC
 STROBE TAPE NUMBER -  000-S00DSK                                                   EXCPS -      176         0.57/SEC


 SAMPLE DATA SET  - WPAJJN.IMSV4R1.WPACI330.S001D001
```

Choosing Between the Execution and Wait Reports

How you analyze the performance of your CICS/DBCTL environment depends on the performance improvement opportunities exposed by the STROBE Performance Profile, and whether your primary focus is on the application programs or on the system-level modules.

For a summary of CPU and I/O resource consumption by task execution and file access activity, examine the Resource Demand Distribution report.

To reduce CPU time consumption, first determine what is using CPU time by examining the Resource Demand Distribution, Program Section Usage Summary, and Transaction Summary reports. If application programs consume most of the time, then analyze the Performance Profile as described in *STROBE MVS Concepts and Facilities*. If system service modules consume most of the CPU time, determine your primary focus. If your focus is on IMS services for DL/I application programs, then analyze the DL/I CPU Summary and CPU Usage by DL/I Request reports. If your focus is on other system service routines, analyze the Attribution of CPU Execution reports.

The Resource Demand Distribution report (Figure 4-2 on page 4-3) summarizes the use of CPU and I/O resources by the task execution and file access activities occurring in the measured job step. All percentages of resource use are based on total run time.

In this example, the CICS management TCBs (DFHKETCB and DFHKETCB1) used more than 4% of the CPU time and were responsible for most of the wait time. Each task DFSPAT00 through DFSPAT002 is a DBCTL thread. The report combines all other activity, including additional thread tasks, under OTHER. To determine which transactions were responsible for the most CPU usage, examine the transaction reports.

Figure 4-2. Resource Demand Distribution Report

** RESOURCE DEMAND DISTRIBUTION **

TASK OR DDNAME	RESOURCE	PERCENT OF RUN TIME SERVICED BY CPU	SERVICED BY I/O	SERVICED BY EITHER	PERCENT OF RUN TIME SPENT SOLO IN CPU	SOLO IN I/O	SOLO IN EITHER	CAUSING CPU WAIT	CUMULATIVE PERCENTAGES SOLO TIME	CAUSING CPU WAIT
DFHKETCB	CPU	2.80	.00	2.80	2.72	.00	2.72	84.77	2.72	84.77
DFSPAT00	CPU	2.31	.00	2.31	2.25	.00	2.25	.00	4.97	84.77
DFSPAT001	CPU	1.82	.00	1.82	1.80	.00	1.80	.00	6.77	84.77
DFHKETCB1	CPU	1.36	.00	1.36	1.36	.00	1.36	.00	8.13	84.77
DFSPAT002	CPU	1.07	.00	1.07	1.03	.00	1.03	.00	9.16	84.77
OTHER	CPU	2.29	.00	2.29	2.18	.00	2.18	.00	11.34	84.77
.FILEMGT		2.01	.05	2.86	2.79	.04	2.83	.00	14.17	84.77
STEPLIB	3380	.00	.80	.80	.00	.75	.75	.74	14.92	85.51
DFHJ01A	3380	.00	.86	.86	.00	.67	.67	.00	15.59	85.51
DFHRPL	3380	.00	.24	.24	.00	.19	.19	.00	15.78	85.51
DFHINTRA	3380	.00	.13	.13	.00	.12	.12	.00	15.90	85.51
DFHTEMP	3380	.00	.04	.04	.00	.04	.04	.00	15.94	85.51
DFHGCD	3380	.01	.03	.04	.01	.02	.03	.00	15.97	85.51
STDCACFL	3380	.01	.02	.03	.01	.01	.02	.01	15.99	85.52

Identifying Opportunities for Reducing CPU Usage in a CICS/DBCTL Region

The Program Section Usage Summary report (Figure 4-3) shows the activity of each program module and subsystem that was active during the measurement session.

In this example, more than 30% of the CPU time was spent executing IMS system service modules. To examine the IMS services for DL/I application programs, analyze the DL/I CPU Summary and CPU Usage by DL/I Request reports.

Figure 4-3. Program section Usage Summary Report

** PROGRAM SECTION USAGE SUMMARY **

MODULE NAME	SECTION NAME	SECTION SIZE	FUNCTION	CPU TIME PERCENT SOLO	TOTAL	CPU TIME HISTOGRAM MARGIN OF ERROR: 2.58% .00 8.00 16.00 24.00 32.00
.SYSTEM	.CICS		CICS SYSTEM SERVICES	9.32	9.88	.***********+
.SYSTEM	.COBLIB		COBOL LIBRARY SUBROUTINE	.07	.07	.
.SYSTEM	.COMMON		COMMON AREA	.14	.14	.
.SYSTEM	.IMS		SUPERVISORY FUNCTIONS	29.49	30.59	.************************************++
.SYSTEM	.IRLM		RESOURCE LOCK MANAGER	16.23	16.57	.********************
.SYSTEM	.NUCLEUS		MVS NUCLEUS	21.34	21.34	.**************************
.SYSTEM	.SVC		SUPERVISOR CONTROL	3.45	3.59	.****
.SYSTEM	.VSAM		VIRTUAL STORAGE ACC METH	17.61	17.68	.**********************
				-----	-----	
.SYSTEM	TOTALS		SYSTEM SERVICES	97.65	99.86	
DLIPLI1	.PL/ILIB	104	PL/I LIBRARY SUBROUTINES	.07	.07	.
DLIPLI1	DLIPLI11	1596		.00	.07	.
				-----	-----	
DLIPLI1	TOTALS	1700		.07	.14	
				-----	-----	
PROGRAM DFHSIP	TOTALS			97.72	100.00	

The DL/I CPU Summary report (Figure 4-4 on page 4-4) identifies the total CPU time by the transaction, module, section, and PSB name that initiated the request for IMS DL/I services.

In this example, more than 22% of the CPU time was spent executing PSB STRIP110 of module DLICO21 and transaction DEC1. The CPU Usage by DL/I Request report (Figure 4-5 on page 4-4) for PSB STRIP110 of module DLICO21 and transaction DEC1 will provide detail information for all DL/I requests.

Figure 4-4. DL/I CPU Summary Report

```
                                        ** DL/I CPU SUMMARY **

                                                      CPU TIME PERCENT      CPU TIME HISTOGRAM  MARGIN OF ERROR:  2.58%
TRANSACTION  MODULE      SECTION     PSB               SOLO     TOTAL       .00      6.00     12.00     18.00     24.00

DCA1         CLIASM1     CLIASM1     STRIP110          6.63      6.70       .***********
DCC1         CLICO21     CLICO21     STRIP110          9.39      9.74       .***************+
DCP1         CLIPLI1     CLIPLI11    STRIP110         10.29     10.36       .*****************
DEA1         DLIASM1     DLIASM1     STRIP110          8.22      8.49       .*************+
DEC1         DLICO21     DLICO21     STRIP110         21.62     22.24       .************************************+
DEP1         DLIPLI1     DLIPLI11    STRIP110          9.67      9.81       .****************
                                                      -----     -----
TOTAL CPU ACTIVITY                                    65.81     67.33
```

The CPU Usage by DL/I Request report (Figure 4-5) for transaction DEC1, module DLICO21, and PSB STRIP110 shows that more than 19% of the CPU time for PSB STRIP110 was executing a Get Hold Next (GHN) function call at program statement line number 215, and hexadecimal location +5D8. It also shows that the reference number is 3. If you look above at the detail line for reference number 3, you see that the PCB Type shows a Database retrieval using PCB LOANPCB and DBD STRIDLON to retrieve and hold an entry from the CUSTROOT segment within the STRIDLON database.

Figure 4-5. CPU Usage by DL/I Request Report

```
                                              ** CPU USAGE BY DL/I REQUEST **

TRANSACTION - DEC1
MODULE      - DLICO21
SECTION     - DLICO21
PSB         - STRIP110
                                                   CALL PARAMETERS

    REF      PCB   PCB NAME   RESOURCE
    NUMBER   TYPE  OR LABEL   NAME          SSA DATA

    000001                    STRIP110
    000002   DB    LOANPCB    STRIDLON      CUSTROOT*-
    000003   DB    LOANPCB    STRIDLON      CUSTROOT*-
    000004   DB    LOANPCB    STRIDLON      LOANSEGM*-
    000005   DB    LOANPCB    STRIDLON      CUSTROOT*-(CUSACTNO =????
                                            LOANSEGM*-(LOANNO   =????
                                                   FUNCTION ACTIVITY

           PROCEDURE   REQUEST     DL/I    REF.      CPU TIME PERCENT      CPU TIME HISTOGRAM  MARGIN OF ERROR:  2.58%
LINE NO.   NAME        LOCATION    FUNC    NUMBER     SOLO     TOTAL       .00      5.00     10.00     15.00     20.00

   183      CALL        000004B4    SCHD    000001      .14       .14       .
   197      CALL        00000526    GHU     000002     1.73      1.73       .***
   215      CALL        000005D8    GHN     000003    18.78     19.41       .*************************************+
   238      CALL        00000676    GHNP    000004      .21       .21       .
   285      CALL        0000088C    GHU     000005      .76       .76       .*
                                                      -----     -----
TOTALS                                                21.62     22.24
```

To provide the line number and procedure name for activity shown in module DLICO21, the map file for the module was included when creating the STROBE Performance Profile. Figure 4-6 on page 4-5 shows the source code.

You should examine the specified module logic, the DL/I call, and its parameter list for the most efficient way to access the data.

The translator output shown below (Figure 4-6 on page 4-5) reveals that line 215 is a call statement generated by the CICS translator in response to the EXEC DLI GET NEXT statement beginning on line 207. Because this statement is responsible for more than 19% of the CPU activity for the session, you should examine this statement to make sure that it is necessary within the context of the entire program.

Figure 4-6. Translator Output for Module DLICO21

```
            *
                 MOVE  SPACES    TO DIBSTAT.                                IMP 60
                 PERFORM UNTIL DIBSTAT NOT = SPACES                         60 IMP
            *EXEC  DLI GET NEXT  USING PCB(2)
            *            SEGMENT('ROOTSRCE')
            *            INTO (ROOTSRCE)
            *      END-EXEC
      1                  MOVE '        DLI     00047   }  d   ' TO DFHEIV0   128
      1                  MOVE 2 TO DFHB0020                                 75
      1                  MOVE 'ROOTSRCE' TO DFHC0080                        97
      1                  MOVE LENGTH OF ROOTSRCE TO DFHB0021                IMP 19 76
      1                 CALL 'DFHEI1' USING DFHEIV0  DLZDIB DFHB0020 DFHC0080   EXT 128 58 75 97
      1           ROOTSRCE DFHB0021                                         19 76
      1                 IF    DIBSTAT = SPACES                              60 IMP
      2                       PERFORM 1000-GNP THRU 1000-GNP-EXIT           228 251
      2                       UNTIL DIBSTAT NOT = SPACES                    60 IMP
      2                       MOVE  SPACES  TO DIBSTAT                      IMP 60
      1                 END-IF
                 END-PERFORM.
            *
```

Identifying CPU Usage by Transaction in a CICS/DBCTL Region

The CICS Performance Supplement includes the Transaction Summary report and the CPU Usage by Control Section reports.

The Transaction Summary report (Figure 4-7 on page 4-6) shows the distribution of CPU time among transactions within the environment. Each transaction appearing in the report is described in more detail in the Transaction Usage by Control Section report.

In this example, transaction DEC1 is responsible for over 24% of the CPU time used by the environment.

Figure 4-7. Transaction Summary Report

TRANSACTION SUMMARY

NAME	CLASS	FUNCTION	TRANS-ACTION COUNT	MESSAGES PER SECOND	TOTAL CPU TIME PERCENT	SERVICE TIME (SEC) MEAN	85 PC	MEDIAN	15 PC	INITIAL PROGRAM
.CICS		CICS SYSTEM SERVICES			20.17					
.DFHJCOC					.07					
.DFHSKTS					1.45					
.DFSPAT0					.28					
.DFSPRRA					.07					
.IGG0CLA					.69					
APED			1	0.00	.83	.58	--	--	--	APEDUMP
CATR-X			1	0.00	.00	.00	--	--	--	DFHZATR
COBI			1	0.00	.21	.18	--	--	--	CIIMSTR
CSAC		ABNORMAL CONDITION	3	0.01	.07	.01	--	--	--	DFHACP
CSKP-X		KEYPOINT FOR RESTART	1	0.00	.07	.00	--	--	--	DFHAKP
CSSY		JOURNAL KICK-OFF PRGM			.14					
CSTP		TERMINAL CONTROL TASK			.28					
DCA1-X			9	0.00	7.11	.00	--	--	--	CLIASM1
DCC1-X			9	0.00	10.36	.00	--	--	--	CLICO21
DCP1-X			9	0.00	10.91	.00	--	--	--	CLIPLI1
DEA1-X			9	0.00	9.46	.00	--	--	--	DLIASM1
DEC1			17	0.06	24.10	5.10	--	--	--	DLICO21
DEP1-X			9	0.00	10.84	.00	--	--	--	DLIPLI1
DLID			3	0.01	.35	6.13	--	--	--	DLIDRIVE
LINK			1	0.00	.21	.18	--	--	--	LINK0
LLAT			1	0.00	.83	.65	--	--	--	LLATEST
TASM	10		1	0.00	.14	.65	--	--	--	TDASM000
WAT0			1	0.00	.14	.06	--	--	--	STRBWAT0
WAT1-X			18	0.00	.07	.00	--	--	--	STRBWAT1
WAT2-X			2	0.00	.07	.00	--	--	--	STRBWAT2
WAT3-X			2	0.00	.55	.00	--	--	--	STRBWAT3
WAT4-X			2	0.00	.21	.00	--	--	--	STRBWAT4
X001	3		1	0.00	.14	.03	--	--	--	XTRAN001
X002	4		1	0.00	.14	1.60	--	--	--	XTRAN002
X003-X	5		5	0.00	.07	.00	--	--	--	XTRAN003
			------	------	------	-----	-----	-----	-----	
TOTAL--		INTERACTIVE TRANSACTIONS	31	0.10	50.28	3.43	6.58	2.44	.18	
TOTAL--		OTHER TRANSACTIONS	76	0.25	49.72					

The CPU Usage by Control Section report (Figure 4-8 on page 4-7) shows the CPU time spent executing each CICS transaction. For transaction DEC1, this report indicates that most of the CPU time was spent in DL/I, IRLM, and VSAM modules rather than CICS modules. This pattern is typical for transactions that invoke DL/I services.

In this example, VSAM module IDA019L1 used the most CPU time (5.52%), while IMS module DFSREP00 used more than 4% and IRLM module DXRRLM10 used 3.52%. To determine what programs invoked these service modules, examine their Attribution of CPU Execution Time reports.

Figure 4-8. CPU Usage by Control Section Report

```
                                        ** TRANSACTION ACTIVITY **

                          CPU USAGE BY CONTROL SECTION FOR TRANSACTION DEC1
------------------------------------------------------------------------------------------------------------
                      SECTION                                  CPU TIME USED, PERCENT
MODULE     ---------------------------------- ---------------------------------------------------------------
NAME       NAME      FUNCTION                    SOLO  TOTAL     .00      5.00      10.00      15.00      20.00
                                                                  .        .          .          .          .
.CICS      DFHAIP    APPL INTERFACE PGM           .14    .14     .
.CICS      DFHDBSPX  CICS-DBCTL SUSPEND EXIT      .07    .07     .
.CICS      DFHDLIDP  DBCTL CALL PROCESSOR         .14    .14     .
.CICS      DFHEDP    EXEC DLI COMMAND STUB        .07    .07     .
.CICS      DFHERM    RESOURCE MGR INT(RMI)MOD     .35    .35     .
.CICS      DFHKCP    TRANS MNGR BOOTSTRP ROUT     .07    .07     .
.CICS      DFHSIP    CICS COMPOSITE ROUTINES      .90    .90     .*
.CICS      DFHTSP    TEMPORARY STOR CNTL PGM      .07    .07     .
.IMS       DFSCPY00  DC-CTL, INTERREG COMM        .21    .21     .
.IMS       DFSDBCTG  SUBR BUILD CONCAT KEYS       .21    .21     .
.IMS       DFSDLA00  DB-CALL ANALYZER             .14    .14     .
.IMS       DFSDLR00  DB-LOGICAL RETRIEVE          .55    .55     .*
.IMS       DFSDSPX0                               .21    .21     .
.IMS       DFSDVBH0  DB-BUFFER HANDLER ROUTER     .28    .28     .
.IMS       DFSDVSM0  DB-VSAM INTERFACE           1.93   1.93     .***
.IMS       DFSIDSP0  DC-IMS DISPATCHER MAIN       .69    .69     .*
.IMS       DFSLMGR0  DB-GLOBAL LOCK MANAGER      1.04   1.04     .**
.IMS       DFSLRH00  DB-LOCK REQUEST HANDLER      .55    .62     .*
.IMS       DFSPTRA0  DBCTL INT TRACE DRA EVNT     .07    .07     .
.IMS       DFSREP00  DC-SCP SENSITVE DISPATCH    3.73   4.07     .*******+
.IRLM      DXRRLM10  IRLM                        3.31   3.52     .******+
.IRLM      DXRRLM40  IRLM                         .21    .21     .
.IRLM      DXRRLM60  IRLM                        1.59   1.59     .***
.NUCLEUS   IEAVECMS  CMSET SERVICE                .14    .14     .
.NUCLEUS   IEAVESLK  SUSPEND LOCK SERVICE         .14    .14     .
.NUCLEUS   IEAVTSFR  SETFRR SERVICE               .14    .14     .
.NUCLEUS   IEAVXSTK  S/B PCLINK STACK/UNSTACK     .55    .55     .*
.SVC       SVC 122   EXT.SVC ROUTER-TYPE 2        .07    .07     .
.SVC       SVC 236   USER SVC                     .14    .14     .
.VSAM      IDA019L1  VSAM RECORD MANAGEMENT      5.52   5.52     .***********
.VSAM      IDA019R0  VSAM                         .28    .28     .
                                               ------ ------
  TOTAL                                         23.48  24.10
```

Attribution of CPU Execution Time

The Attribution of CPU Execution Time reports identify which system service routines (for IMS Version 3 and higher) were invoked by a specific module. These reports also indicate the location in the calling module that invoked the system service routine. (For a description of this report, see “The Attribution of CPU Execution Time Report for IMS Environments” on page 1-13.) In this example (Figure 4-9 on page 4-8), the statement at line 215 in module DLICO21 is responsible for a majority of the CPU time in all three supervisory routines. An examination of the code (Figure 4-6 on page 4-5) shows the statement text.

In this example, the code was indexed before the STROBE Performance Profile was generated, and the text is a result of indexing output from the COBOL compiler.

Figure 4-9. Attribution of CPU Execution Time Reports

```
                                      ** ATTRIBUTION OF CPU EXECUTION TIME **

 .IMS     DFSREP00 DFSREP00  DC-SCP SENSITVE DISPATCH
 ---------------------------WAS INVOKED BY---------------------   -----------------VIA-----------------------  CPU TIME %
 XACTION  MODULE   SECTION    RETURN  LINE   PROCEDURE NAME       MODULE   SECTION  FUNCTION                   SOLO  TOTAL

 DCA1     CLIASM1  CLIASM1    0000F2                              DFHAIP            APPL INTERFACE PGM          .35    .35
 DCA1     CLIASM1  CLIASM1    00013E                              DFHAIP            APPL INTERFACE PGM          .97    .97
 DCA1     CLIASM1  CLIASM1    000266                              DFHAIP            APPL INTERFACE PGM          .07    .07
 DCC1     CLIC021  CLIC021    0004DE                              DFHAIP            APPL INTERFACE PGM          .21    .21
 DCC1     CLIC021  CLIC021    000574                              DFHAIP            APPL INTERFACE PGM          .83    .83
 DCP1     CLIPLI1  CLIPLI11   0002CC                              DFHAIP            APPL INTERFACE PGM         1.10   1.10
 DCP1     CLIPLI1  CLIPLI11   000480                              DFHAIP            APPL INTERFACE PGM          .14    .14
 DEA1     DLIASM1  DLIASM1    000100                              DFHEDP            EXEC DLI COMMAND STUB       .14    .21
 DEA1     DLIASM1  DLIASM1    000148                              DFHEDP            EXEC DLI COMMAND STUB      1.04   1.10
 DEC1     DLIC021  DLIC021    000526   197      CALL              DFHEDP            EXEC DLI COMMAND STUB       .35    .35
 DEC1     DLIC021  DLIC021    0005D8   215      CALL              DFHEDP            EXEC DLI COMMAND STUB      3.18   3.52
 DEC1     DLIC021  DLIC021    000676   238      CALL              DFHEDP            EXEC DLI COMMAND STUB       .14    .14
 DEC1     DLIC021  DLIC021    00088C   285      CALL              DFHEDP            EXEC DLI COMMAND STUB       .07    .07
 DEP1     DLIPLI1  DLIPLI11   00026C                              DFHEDP            EXEC DLI COMMAND STUB       .14    .14
 DEP1     DLIPLI1  DLIPLI11   0002EA                              DFHEDP            EXEC DLI COMMAND STUB      1.17   1.17
                                                                                                              -----  -----
                                                                                                               9.88  10.36

 .IRLM    DXRRLM10            IRLM
 ---------------------------WAS INVOKED BY---------------------   -----------------VIA-----------------------  CPU TIME %
 XACTION  MODULE   SECTION    RETURN  LINE   PROCEDURE NAME       MODULE   SECTION  FUNCTION                   SOLO  TOTAL

 DCA1     CLIASM1  CLIASM1    0000F2                              DFHAIP            APPL INTERFACE PGM          .28    .28
 DCA1     CLIASM1  CLIASM1    00013E                              DFHAIP            APPL INTERFACE PGM          .90    .90
 DCC1     CLIC021  CLIC021    0004DE                              DFHAIP            APPL INTERFACE PGM          .07    .07
 DCC1     CLIC021  CLIC021    000574                              DFHAIP            APPL INTERFACE PGM         1.66   1.66
 DCP1     CLIPLI1  CLIPLI11   00028A                              DFHAIP            APPL INTERFACE PGM          .28    .28
 DCP1     CLIPLI1  CLIPLI11   0002CC                              DFHAIP            APPL INTERFACE PGM         1.10   1.17
 DEA1     DLIASM1  DLIASM1    000148                              DFHEDP            EXEC DLI COMMAND STUB      1.10   1.10
 DEC1     DLIC021  DLIC021    000526   197      CALL              DFHEDP            EXEC DLI COMMAND STUB       .07    .07
 DEC1     DLIC021  DLIC021    0005D8   215      CALL              DFHEDP            EXEC DLI COMMAND STUB      3.18   3.38
 DEC1     DLIC021  DLIC021    00088C   285      CALL              DFHEDP            EXEC DLI COMMAND STUB       .07    .07
 DEP1     DLIPLI1  DLIPLI11   00026C                              DFHEDP            EXEC DLI COMMAND STUB       .07    .07
 DEP1     DLIPLI1  DLIPLI11   0002EA                              DFHEDP            EXEC DLI COMMAND STUB      1.24   1.24
                                                                                                              -----  -----
                                                                                                              10.01  10.29

 .VSAM    IDA019L1            VSAM RECORD MANAGEMENT
 ---------------------------WAS INVOKED BY---------------------   -----------------VIA-----------------------  CPU TIME %
 XACTION  MODULE   SECTION    RETURN  LINE   PROCEDURE NAME       MODULE   SECTION  FUNCTION                   SOLO  TOTAL

 DCA1     CLIASM1  CLIASM1    0000F2                              DFHAIP            APPL INTERFACE PGM          .07    .07
 DCA1     CLIASM1  CLIASM1    00013E                              DFHAIP            APPL INTERFACE PGM          .83    .83
 DCA1     CLIASM1  CLIASM1    000186                              DFHAIP            APPL INTERFACE PGM          .07    .07
 DCA1     CLIASM1  CLIASM1    000266                              DFHAIP            APPL INTERFACE PGM          .07    .07
 DCC1     CLIC021  CLIC021    0004DE                              DFHAIP            APPL INTERFACE PGM          .21    .21
 DCC1     CLIC021  CLIC021    000574                              DFHAIP            APPL INTERFACE PGM         2.28   2.35
 DCP1     CLIPLI1  CLIPLI11   00028A                              DFHAIP            APPL INTERFACE PGM          .07    .07
 DCP1     CLIPLI1  CLIPLI11   0002CC                              DFHAIP            APPL INTERFACE PGM         2.76   2.76
 DCP1     CLIPLI1  CLIPLI11   000480                              DFHAIP            APPL INTERFACE PGM          .07    .07
 DEA1     DLIASM1  DLIASM1    000100                              DFHEDP            EXEC DLI COMMAND STUB       .14    .14
 DEA1     DLIASM1  DLIASM1    000148                              DFHEDP            EXEC DLI COMMAND STUB      2.21   2.21
 DEC1     DLIC021  DLIC021    000526   197      CALL              DFHEDP            EXEC DLI COMMAND STUB       .35    .35
 DEC1     DLIC021  DLIC021    0005D8   215      CALL              DFHEDP            EXEC DLI COMMAND STUB      4.97   4.97
 DEC1     DLIC021  DLIC021    00088C   285      CALL              DFHEDP            EXEC DLI COMMAND STUB       .21    .21
 DEP1     DLIPLI1  DLIPLI11   00026C                              DFHEDP            EXEC DLI COMMAND STUB       .28    .28
 DEP1     DLIPLI1  DLIPLI11   0002EA                              DFHEDP            EXEC DLI COMMAND STUB      1.80   1.80
                                                                                                              -----  -----
                                                                                                              16.37  16.44
```

Chapter 5. The STROBE Performance Profile for IMS Supervisory Regions

This chapter shows reports from two sample STROBE Performance Profiles: one from an IMS control region and one from a DL/I Separate Address Space (DLISAS).

Analyzing the Reports from an IMS Control Region

The Measurement Session Data report (Figure 5-1) describes the environment during a measurement session. When STROBE measures a job step executing in IMS, the report shows in the SUBSYSTEM field the version and release number of IMS, a region identifier, and the Local Storage Option (LSO). In this example, the region identifier “CTL” shows that this is an IMS control region. (For a list of other region identifiers, see “Analyzing the Reports for an MPR Region” on page 3-1.)

Figure 5-1. Measurement Session Data Report

```
                                          ** MEASUREMENT SESSION DATA **

-------- JOB ENVIRONMENT --------       ------- MEASUREMENT PARAMETERS ------         ----- MEASUREMENT STATISTICS ----

PROGRAM MEASURED   -    DFSMVRC0        ESTIMATED SESSION TIME  -       3 MIN         CPS TIME PERCENT -            6.14
JOB NAME           -     IMS002         TARGET SAMPLE SIZE      -      10,000         WAIT TIME PERCENT -          93.86
JOB NUMBER         -    STC04029        REQUEST NUMBER      (A) -         637         RUN MARGIN OF ERROR PCT  -     .98
STEP NAME   -               I002        FINAL SESSION ACTION    -        QUIT         CPU MARGIN OF ERROR PCT  -    1.18

DATE OF SESSION    -  06/28/1998        OPTIONS -  IMS                                TOTAL SAMPLES TAKEN -       10,000
TIME OF SESSION    -    11:27:37                                                      TOTAL SAMPLES PROCESSED -   10,000
CONDITION CODE     -      C-0000                                                      INITIAL SAMPLING RATE- 166.67/SEC
                                        --------- REPORT PARAMETERS ---------         FINAL SAMPLING RATE  - 166.67/SEC
SYSTEM -              ESA SP4.3.0
DFSMS             -         1.2.0       REPORT RESOLUTION     -        64 BYTES       SESSION TIME -    1 MIN  6.95 SEC
SUBSYSTEM   -    IMS CTL 3.1 L=S        LINES/PAGE            -              60       CPU TIME -        0 MIN  5.19 SEC
                         DB2 2.3.0                                                    WAIT TIME    -    0 MIN 49.80 SEC
CPU MODEL          -        9021        DATE FORMAT                  MM/DD/YYYY       STRETCH TIME -    0 MIN 12.14 SEC
SMF/SYSTEM ID -       SYSC/TLP002       TIME FORMAT (24 HOURS)         HH:MM:SS
                                                                                      SRB TIME     -    0 MIN  0.55 SEC
REGION SIZE BELOW 16M  -  9,196K                                                      SERVICE UNITS-                4911
REGION SIZE ABOVE  -    131,072K
                                                                                      PAGES IN-      0     OUT-        0
PTF LVL- 2.2.1.FS000000/FS000000                                                      PAGING RATE  -           0.00/SEC
STROBE TAPE NUMBER -  000-S00DSK                                                      EXCPS -   7,778        116.18/SEC


SAMPLE DATA SET  - STROBE.CTLRGN.S001D001
```

Choosing Between Execution and I/O Reports

To examine CPU activity, analyze the transaction reports to determine which function-specific transactions used the most CPU time. Analyze the Program Module reports to determine which modules used the most CPU time, as shown in “Identifying CPU Usage in a Control Region” on page 5-2.

To examine I/O activity, analyze the Resource Demand Distribution, Data Set Characteristics, I/O Facility Utilization Summary, and DASD Usage by Cylinder reports, as shown in “Identifying I/O Activity in a Control Region” on page 5-4.

The Transaction Summary report (Figure 5-2 on page 5-2) shows the distribution of CPU time among function-specific pseudo-transactions within the region. Each pseudo-transaction appearing in the report is described in more detail in the Transaction Usage by Control Section report.

Identifying CPU Usage in a Control Region

In the transaction reports for control regions, STROBE assigns CPU time to pseudo-transactions representing the IMS ITASK being executed. The STROBE-assigned pseudo-transaction names are made up of a three-character task identifier followed by a slash ("/"), concatenated with characters four through seven of the active module name. (For a list of common ITASK identifiers, see "Transaction Identification for IMS System Regions" on page 1-8.)

For example, the name of the load module that performs database recovery management is DFSDSST0. To create its pseudo-transaction, STROBE begins with the identifier "CTL/" to indicate that the task is the control region task, and appends the characters four through seven of the load module name to produce the pseudo-transaction name "CTL/DSST".

If STROBE cannot determine an ITASK identifier, it assigns as the pseudo-transaction name the name of the load module first entered by the task. In the example in Figure 5-2, the DB Interval Timer task starts with load module DFSDFLD0 and is therefore assigned a pseudo-transaction name of DFSDFLD0.

Figure 5-2. Transaction Summary Report

```
                                                  ** TRANSACTION SUMMARY **
  TRANSACTION    FUNCTION              TRANSACTION   AVERAGE     % CPU TIME    CPU TIME HISTOGRAM  MARGIN OF ERROR:  6.07%
     NAME                                 COUNT      SERVICE    SOLO   TOTAL   .00       25.00      50.00      75.00     100.00
                                                     TIME
    CTL/BC00     DB-CONTROL BLOCK SERVICE      19       0.44    1.94    2.10   .***+
    CTL/BML0     DB-BLOCK MOVER SERIALIZE      40       0.26     .65     .81   .*
    CTL/DBAU     DB-DATA SHARE AUTH REQ.      144       0.12    9.05   11.79   .******************+++++
    CTL/DBCT     SUBR BUILD CONCAT KEYS         7       0.08     .81    1.29   .*+
    CTL/DPDM     DB-PSB AND DMB POOL          193       0.34   10.34   12.92   .********************+++++
    CTL/DSST     DB-DATABASE RESOURCE MGR     616       0.19   11.95   15.83   .***********************++++++++
    CTL/DVBH     DB-BUFFER HANDLER ROUTER      84       0.05     .32     .32   .
    CTL/FLLG     DB-LOGICAL LOGGER             42       0.09     .32     .65   .+
    CTL/FXC5     DB-DATABASE SYNC POINT         9       0.11     .65     .81   .*
    CTL/IDSP     DC-IMS DISPATCHER MAIN        77       0.14    2.10    2.42   .****
    CTL/IIDE     DB-IMS COMMON DEQUEUE         14       0.37    2.58    3.39   .*****+
    CTL/IIEN     DB-IMS COMMON ENQUEUE         12       0.39    2.10    2.58   .****+
    CTL/ISMN     DB-STORAGE MANAGEMENT        142       0.21    4.20    5.65   .********+++
    CTL/REP0     DC-SCP SENSITVE DISPATCH      11       0.44    2.10    2.10   .****
    CTL/SBIL     SUPERVISORY FUNCTIONS        121       0.07     .81     .97   .*
    CTL/SDL7     DC-ONLN BLOCK MOVER VCON     523       0.22   14.54   18.26   .*****************************+++++++
    CTL/SDL8     DC-ONLN BLOCK MOVER VCON     204       0.19    3.72    5.17   .*******+++
    CTL/VESC     SCHEDULE SERVICE              73       0.06     .97    1.29   .*+
    CTL/VETC     SUSPEND SERVER ROUTINE        14       0.13     .16     .32   .
    CTL/VTSF     SETFRR SERVICE                 6       0.27     .16     .16   .
    DFSFDLD0     DB-INTERVAL TIMER             17       0.15     .65     .81   .*
    LOG/FDLG     DC LOGGER MASTER ITASK         4       1.12    3.88    4.68   .*******++
    LOG/IDSP     LOG TASK                      18       0.42    2.75    3.23   .*****+
    LOG/REP0     LOG TASK                      11       0.39    1.94    1.94   .***
    LOG/VESC     LOG TASK                       5       0.41     .32     .32   .
    LOG/VTSF     LOG TASK                       3       0.33     .16     .16   .
                                            -----      -----   -----   -----
  PROGRAM DFSMVRC0 TOTALS                    2409       0.26   79.16  100.00
```

The Transaction Usage by Control Section report (Figure 5-3 on page 5-3) shows, for each IMS pseudo-transaction, the CPU time spent in each module executed to perform the service function represented by the pseudo-transaction.

Activity in DFS and DBF modules is compressed as .IMS. The true name of each module appears in the SECTION NAME field of the report detail lines and is followed by a brief description of its function.

Figure 5-3. Transaction Usage by Control Section Report

```
                                   ** TRANSACTION USAGE BY CONTROL SECTION **

TRANSACTION CTL/DSST          DB-DATABASE RESOURCE MGR

 MODULE   SECTION                                        CPU TIME PERCENT      CPU TIME HISTOGRAM  MARGIN OF ERROR:  3.94%
  NAME     NAME   COMPRESSED    FUNCTION                  SOLO     TOTAL       .00      5.00      10.00    15.00     20.00

 .IMS     DFSDSST0 DFSDSST0 DB-DATABASE RESOURCE MGR  11.95     15.83       .**********************++++++++
                                                     -----     -----
TRANSACTION CTL/DSST  TOTALS                           11.95     15.83
```

The Program Section Usage Summary report (Figure 5-4) shows the activity of each pseudo-module that was active during the measurement session. In this example, most of the CPU activity is used by IMS supervisory functions.

Figure 5-4. Program Section Usage Summary Report

```
                                   ** PROGRAM SECTION USAGE SUMMARY **

 MODULE  SECTION 16M   SECT  FUNCTION                  CPU TIME PERCENT       CPU TIME HISTOGRAM  MARGIN OF ERROR:  3.94%
   NAME  NAME    <,>   SIZE                             SOLO     TOTAL        .00      24.50      49.00     73.50     98.00

.SYSTEM  .IMS                SUPERVISORY FUNCTIONS     76.74     96.93        .*******************************++++++++
.SYSTEM  .NUCLEUS            MVS NUCLEUS                1.78      2.26        .
.SYSTEM  .SVC                SUPERVISOR CONTROL          .65       .81        .
                                                       -----     -----
.SYSTEM  TOTALS              SYSTEM SERVICES           79.17    100.00

                                                       -----     -----
PROGRAM DFSMVRC0 TOTALS                                79.16    100.00
```

The Program Usage by Procedure report (Figure 5-5 on page 5-4) shows the actual names of all modules within the pseudo-modules. If control section mapping data was available the report shows control sections within modules. STROBE also displays function descriptors for the control section or module.

In this example, modules DFSDSST0, DFSDPDM0, and DFSDBAU0 were responsible for over one-third of the CPU time used by IMS control functions.

Figure 5-5. Program Usage by Procedure Report

```
                                       ** PROGRAM USAGE BY PROCEDURE **


         .SYSTEM   SYSTEM SERVICES                       .IMS      SUPERVISORY FUNCTIONS

MODULE   SECTION        FUNCTION            INTERVAL  CPU TIME PERCENT       CPU TIME HISTOGRAM  MARGIN OF ERROR:  3.94%
  NAME      NAME                              LENGTH   SOLO     TOTAL        .00       4.00      8.00      12.00      16.00

DFSBC000 DFSSBLK0  DB-SCAN CONTROL BLOCK        1116    .97       .97        .**
DFSBC000 DFSSCBT0  DB-CBTS SERVICE ROUTINE      1142    .97      1.13        .**
DFSBML00           DB-BLOCK MOVER SERIALIZE       64    .65       .81        .*+
DFSDBAU0 DFSDBAU0  DB-DATA SHARE AUTH REQ.     13055   9.05     11.79        .**********************+++++++
DFSDBCTG           SUBR BUILD CONCAT KEYS      64944    .81      1.29        .**+
DFSDPDM0 DFSDPDM0  DB-PSB AND DMB POOL          4084  10.34     12.92        .*************************+++++++
DFSDSST0 DFSDSST0  DB-DATABASE RESOURCE MGR      740  11.95     15.83        .*****************************++++++++++
DFSDVBH0           DB-BUFFER HANDLER ROUTER    14992    .32       .32        .
DFSFDLG0 DFSFDLB0  DB-LOGGER-BUFFER ITASK       6996   1.94      1.94        .****
DFSFDLG0 DFSFDLG0  DB-LOGGER-MASTER ITASK      10880   1.94      2.75        .****++
DFSFLLG0           DB-LOGICAL LOGGER            7888    .32       .65        .+
DFSFXC50           DB-DATABASE SYNC POINT       5024    .65       .81        .*+
DFSIDSP0 DFSIDSP0  DC-IMS DISPATCHER MAIN      11536   4.85      5.65        .************++
DFSIIDE0 DFSIIDE0  DB-IMS COMMON DEQUEUE         304   2.58      3.39        .******++
DFSIIEN0 DFSIIEN0  DB-IMS COMMON ENQUEUE         388   2.10      2.58        .*****+
DFSISMN0 DFSISMM0  DB-STORAGE MANAGEMENT        5301   4.20      5.65        .**********++++
DFSREP00 DFSREP00  DC-SCP SENSITVE DISPATCH    10490   4.04      4.04        .**********
DFSSBIL0                                       33192    .81       .97        .**
DFSSDL70 DFSDBLI0  DB-PSB INTENT LIST LOAD      2594   2.75      4.04        .******++++
DFSSDL70 DFSDBLM0  DB-ACB LOAD AND RELOCATE     2168   5.01      6.14        .************+++
DFSSDL70 DFSDBLN0  DB-DMB LOAD AND RELOCATE     2096   6.79      8.08        .****************++++
DFSSDL80 DFSDBLB0  DB-DMB LOAD AND RELOCATE      320   1.13      1.29        .**+
DFSSDL80 DFSDBLD0  DB-DMB LOAD AND RELOCATE     2202   1.62      2.42        .****++
DFSSDL80 DFSDBLP0  DB-PSB LOAD AND RELOCATE     2368    .97      1.45        .**+
                                                      -----     -----
         .IMS      TOTALS                             76.76     96.91
```

Identifying I/O Activity in a Control Region

The Resource Demand Distribution report (Figure 5-6) summarizes the use of CPU and I/O resources by the task execution and file access activities occurring in the control region. All percentages of resource use are based on the total run time.

In this example, DDNAME DFSWADS0 (the Write-Ahead Data Set) was responsible for the most I/O activity. For more details about this data set, examine the Data Set Characteristics report.

Figure 5-6. Resource Demand Distribution Report

```
                                        ** RESOURCE DEMAND DISTRIBUTION **

                              ---- PERCENT OF RUN TIME -----     ----- PERCENT OF RUN TIME SPENT -------    CUMULATIVE PERCENTAGES
TASK OR    RESOURCE            SERVICED  SERVICED  SERVICED        SOLO      SOLO       SOLO     CAUSING         SOLO     CAUSING
 DDNAME                          BY CPU    BY I/O  BY EITHER     IN CPU    IN I/O   IN EITHER   CPU WAIT         TIME    CPU WAIT

DFSXDSP0   CPU                     5.50       .00      5.50        4.30       .00       4.30        .00          4.30         .00
DFSXDSP01  CPU                      .64       .00       .64         .56       .00        .56        .00          4.86         .00
DFSFDLD0   CPU                      .05       .00       .05         .04       .00        .04        .00          4.90         .00
DFSXDSP02  CPU                      .00       .00       .00         .00       .00        .00      66.81          4.90       66.81
DFSWADS0   3390                     .00     28.37     28.37         .00     26.04      26.04      27.05         30.94       93.86
DFSOLP06   3390                     .00      4.07      4.07         .00      2.48       2.48        .00         33.42       93.86
```

The Data Set Characteristics report (Figure 5-7 on page 5-5) shows, for each data set accessed during the measurement session, the access method, block size, and data set name. The number of I/O operations (EXCPs) performed during the measurement session appears as well. In the example shown, the EXCP counts confirm the heavy use of the Write-Ahead Data Sets (WADS) identified in the Resource Demand Distribution report. To determine what volume this data set resides on, examine the I/O Facility Utilization Summary report.

Figure 5-7. Data Set Characteristics Report

```
                                            ** DATA SET CHARACTERISTICS **

DDNAME     ACCESS    POOL   REC  BLK/CI      HBUF  BUF  RPL  -SPLITS-     EXCP  DATA SET NAME
           METHOD      NO  SIZE   SIZE         NO   NO STRNO CI    CA   COUNTS

DFSOLP06 BSAM             26620  26624               5                     348  IMS.I002.OLDSP06
DFSWADS0 QSAM              2080   2080                                   7,430  IMS.I002.WADS0
```

The I/O Facility Utilization Summary report (Figure 5-8) summarizes I/O access by device, volume, and ddname. In this example, the Write-Ahead Data Set resides on a single unit. For more information about I/O activity for each cylinder, examine the DASD Usage by Cylinder reports.

Figure 5-8. I/O Facility Utilization Summary Report

```
                                    ** I/O FACILITY UTILIZATION SUMMARY **

UNIT    DEVICE     CACHE  VOLUME DDNAME           RUN TIME PERCENT        RUN TIME HISTOGRAM  MARGIN OF ERROR:   .98%
 NO      TYPE       ELIG    ID                I/O  SOLO      TOTAL       .00       7.50      15.00      22.50      30.00


115    DA 3390            IMSW02    DFSWADS0    I   26.04     28.41       .***********************************+++

226    DA 3390            IMS006    DFSOLP06         2.48      4.07       .***++
```

The DASD Usage by Cylinder report (Figure 5-9) identifies data set activity by unit, volume, ddname and cylinder. This example shows the distribution of I/O activity across each cylinder of the WADS.

Figure 5-9. DASD Usage by Cylinder Report

```
                                         ** DASD USAGE BY CYLINDER **


DEVICE ADDRESS  - 115    TYPE - 3390

  VOLUME         DDNAME             CYLINDER          RUN TIME PERCENT       RUN TIME HISTOGRAM  MARGIN OF ERROR:   .98%
    ID                               NUMBER             SOLO      TOTAL      .00       2.00       4.00       6.00       8.00

  IMSW02        DFSWADS0               23               5.81       6.26      .******************************++
                DFSWADS0               24               5.64       6.10      .*****************************++
                DFSWADS0               25               5.23       5.66      .**************************++
                DFSWADS0               26               5.74       6.39      .******************************+++
                DFSWADS0               27               3.62       4.00      .******************++
                                                       -----      -----
DEVICE ADDRESS  - 115 TOTALS                           26.04      28.41
```

Since usage of the WADS by transactions is single-threaded, it is important to ensure that the WADS has a large enough allocation to service the transactions that use it the most.

Analyzing the Reports for a DL/I Separate Address Space

The Measurement Session Data report (Figure 5-10 on page 5-6) describes the environment during a measurement session. When STROBE measures a job step executing in IMS, the report shows in the SUBSYSTEM field the version and release number of IMS, a region identifier, and the Local Storage Option (LSO). In this example, the region identifier DLS shows that this is a DL/I Separate Address Space (DLISAS). (For a list of other region identifiers, see “Analyzing the Reports for an MPR Region” on page 3-1.)

Figure 5-10. Measurement Session Data Report

```
                                           ** MEASUREMENT SESSION DATA **

 -------- JOB ENVIRONMENT --------        ------- MEASUREMENT PARAMETERS ------        ----- MEASUREMENT STATISTICS ----

 PROGRAM MEASURED    -    DFSMVRC0        ESTIMATED SESSION TIME  -       1 MIN        CPS TIME PERCENT -           1.87
 JOB NAME            -      DLI002        TARGET SAMPLE SIZE      -      10,000        WAIT TIME PERCENT -         98.13
 JOB NUMBER          -    STC04031        REQUEST NUMBER     (A)  -           4        RUN MARGIN OF ERROR PCT  -    .98
 STEP NAME   -              DLI002        FINAL SESSION ACTION    -        QUIT        CPU MARGIN OF ERROR PCT  -   1.39

 DATE OF SESSION    -  05/27/1998         OPTIONS -  IMS                               TOTAL SAMPLES TAKEN -      10,000
 TIME OF SESSION    -    11:25:46                                                      TOTAL SAMPLES PROCESSED -  10,000
 CONDITION CODE     -      C-0000         --------- REPORT PARAMETERS ---------        INITIAL SAMPLING RATE- 166.67/SEC
                                                                                       FINAL SAMPLING RATE  - 166.67/SEC
 SYSTEM -              ESA SP4.3.0        REPORT RESOLUTION    -       64 BYTES
 DFSMS              -        1.2.0        LINES/PAGE           -             60        SESSION TIME -    1 MIN 54.56 SEC
 SUBSYSTEM   -    IMS DLS 3.1 L=S                                                      CPU TIME -        0 MIN  4.20 SEC
                         DB2 2.3.0        NODASD  ATTR= 1.0%   -                       WAIT TIME    -    0 MIN 51.48 SEC
 CPU MODEL           -        9021                                                     STRETCH TIME -    0 MIN 58.96 SEC
 SMF/SYSTEM ID -      SYSC/TLP002         DATE FORMAT                    MM/DD/YYYY
                                          TIME FORMAT (24 HOURS)           HH:MM:SS    SRB TIME     -    0 MIN  0.32 SEC
 REGION SIZE BELOW 16M  -  9,196K                                                      SERVICE UNITS-               3914
 REGION SIZE ABOVE  -    131,072K
                                                                                       PAGES IN-      0     OUT-       0
 PTF LVL- 2.5.1.FS000000/FS000000                                                      PAGING RATE  -          0.00/SEC
 STROBE TAPE NUMBER -  000-S00DSK                                                      EXCPS -  44,936        391.97/SEC

 SAMPLE DATA SET  - STROBE.DLSRGN.S001D001
```

Choosing Between Execution and I/O Reports

Because the DLISAS owns all of the IMS database data sets, it is I/O-intensive. To examine the I/O activity, analyze the Resource Demand Distribution, Data Set Characteristics, I/O Facility Utilization Summary, and DASD Usage by Cylinder reports, as shown in “Identifying I/O Activity in a DLISAS”.

To examine the CPU activity, analyze the Transaction Summary and Transaction Usage by Control Section reports, as shown in “Identifying CPU Activity in a DLISAS” on page 5-8.

Identifying I/O Activity in a DLISAS

The Resource Demand Distribution report (Figure 5-11) summarizes the use of CPU and I/O resources by the task execution and file access activities occurring in the DLISAS region. All percentages of resource use are based on the total run time. The SERVICED BY I/O percentages can be greater than 100% because the DLISAS region owns the database data sets and handles multiple concurrent I/O activities for dependent regions.

Figure 5-11. Resource Demand Distribution Report

```
                                      ** RESOURCE DEMAND DISTRIBUTION **

                      ---- PERCENT OF RUN TIME -----    ----- PERCENT OF RUN TIME SPENT -------    CUMULATIVE PERCENTAGES
 LASK OR   RESOURCE    SERVICED  SERVICED  SERVICED        SOLO      SOLO      SOLO     CAUSING          SOLO     CAUSING
  DDNAME                BY CPU    BY I/O  BY EITHER       IN CPU    IN I/O  IN EITHER   CPU WAIT         TIME    CPU WAIT

 DFSMVRC0  CPU            1.30       .00      1.30          .00       .00       .00       .00            .00       .00
 DFSXDSP0  CPU             .00       .00       .00          .00       .00       .00      2.71            .00      2.71
 CWPDAP01  3390            .00     31.55     31.55          .00       .09       .09       .09            .09      2.80
 CRZDAP01  3390            .00     43.50     43.50          .00       .06       .06      4.90            .15      7.70
 FC1DAP01  3390            .00     41.98     41.98          .00       .06       .06      1.25            .21      8.95
 FC2DAP01  3390            .00     51.21     51.21          .00       .05       .05       .43            .26      9.38
 CWADAP01  3390            .00     31.29     31.29          .00       .04       .04       .10            .30      9.48
 QCADAP01  3390            .00     10.90     10.90          .00       .02       .02     10.17            .32     19.65
 LM2DAP01  3390            .00      6.72      6.72          .00       .02       .02       .54            .34     20.19
 RZ1DAP01  3390            .00      3.96      3.96          .00       .02       .02      1.05            .36     21.24
 CSEDAP01  3390            .00     18.49     18.49          .00       .01       .01      2.32            .37     23.56
 FC6DAP01  3390            .00     16.18     16.18          .00       .01       .01       .63            .38     24.19
   OTHER   I/O             .57    434.33    434.78          .00       .16       .16     73.94            .54     98.13
```

In this example, five data sets (CRZDAP01, CWADAP01, CWPDAP01, FC1DAP01, and FC2DAP01) are responsible for most of the I/O activity in the region. For more details about these data sets, examine the Data Set Characteristics report.

Figure 5-12 shows an abbreviated version of the Data Set Characteristics report. This example shows, for each data set accessed during the measurement session, the access method, block size, and data set name. The number of I/O operations performed (EXCPs) during the measurement session appears as well. In the example shown, the EXCP counts confirm the heavy use of the data sets identified in the Resource Demand Distribution report. To determine which volumes these data sets reside on, examine the I/O Facility Utilization Summary report.

Figure 5-12. Data Set Characteristics Report

```
                                                 ** DATA SET CHARACTERISTICS **

DDNAME      ACCESS     POOL    REC   BLK/CI       HBUF   BUF  RPL   -SPLITS-      EXCP  DATA SET NAME
            METHOD       NO    SIZE   SIZE          NO    NO STRNO CI     CA    COUNTS

CRWS1P01 VSAM KSDS  LSR       34    4096           13500 151                        2  IMSV.ARWS1P01
CRWS1P01 VSAM INDEX LSR     4089    4096           13500 151                        1  IMSV.ARWS1P01
CRYDAP01 OSAM               4096    4096                                           28  IMSVS.ARYDAP01
CRYS1P01 VSAM KSDS  LSR       66    4096           13500 151                       19  IMSV.ARYS1P01
CRYS1P01 VSAM INDEX LSR     4089    4096           13500 151                        4  IMSV.ARYS1P01
CRZDAP01 OSAM               8192    8192                                        2,153  IMSVS.ARZDAP01
CRZSAP01 VSAM KSDS  LSR       26    4096           13500 151                        5  IMSV.ARZSAP01
CRZSAP01 VSAM INDEX LSR     4089    4096           13500 151                        1  IMSV.ARZSAP01
CRZSCP01 VSAM KSDS  LSR       56    8192            3200 151                        4  IMSV.ARZSCP01
CRZSCP01 VSAM INDEX LSR     4089    4096           13500 151                        1  IMSV.ARZSCP01
                  .
                  .
                  .
CT4DAP01 OSAM               4096    4096                                            8  IMSVS.AT4DAP01
CT4INP01 VSAM KSDS  LSR       24    4096           13500 151                        1  IMSV.AT4INP01
CT4INP01 VSAM INDEX LSR     4089    4096           13500 151                           IMSV.AT4INP01
CT5DAP01 OSAM               4096    4096                                               IMSVS.AT5DAP01
CWADAP01 VSAM ESDS  LSR     8185    8192            3200 151                    2,186  IMSV.AWADAP01
CWASAP01 VSAM KSDS  LSR       16    4096           13500 151                      124  IMSV.AWASAP01
CWASAP01 VSAM INDEX LSR     4089    4096           13500 151                        2  IMSV.AWASAP01
CWAS1P01 VSAM KSDS  LSR      140    8192            3200 151                       46  IMSV.AWAS1P01
CWAS1P01 VSAM INDEX LSR     4089    4096           13500 151                        4  IMSV.AWAS1P01
                  .
                  .
                  .
CWPDAP01 OSAM               4096    4096                                        1,869  IMSVS.AWPDAP01
CWPSAP01 VSAM KSDS  LSR       30    4096           13500 151                           IMSV.AWPSAP01
CWPSAP01 VSAM INDEX LSR     4089    4096           13500 151                           IMSV.AWPSAP01
CWPS1P01 VSAM KSDS  LSR       20    4096           13500 151                        2  IMSV.AWPS1P01
CWPS1P01 VSAM INDEX LSR     4089    4096           13500 151                           IMSV.AWPS1P01
CWPS2P01 VSAM KSDS  LSR       48    4096           13500 151                       38  IMSV.AWPS2P01
                  .
                  .
                  .
FCGS1P01 VSAM INDEX LSR     8185    8192            3200 151                       10  IMSV.MCGS1P01
FCGS2P01 VSAM KSDS  LSR      176    4096           13500 151                       23  IMSV.MCGS2P01
FCGS2P01 VSAM INDEX LSR     8185    8192            3200 151                       10  IMSV.MCGS2P01
FC1DAP01 OSAM               8192    8192                                        2,411  IMSVS.MC1DAP01
FC1S3P01 VSAM KSDS  LSR       24    4096           13500 151                        9  IMSV.MC1S3P01
FC1S3P01 VSAM INDEX LSR     2041    2048            2000 151                           IMSV.MC1S3P01
FC1S4P01 VSAM KSDS  LSR       30    4096           13500 151                       31  IMSV.MC1S4P01
FC1S4P01 VSAM INDEX LSR     4089    4096           13500 151                           IMSV.MC1S4P01
FC1S5P01 VSAM KSDS  LSR       36    4096           13500 151                        5  IMSV.MC1S5P01
FC1S5P01 VSAM INDEX LSR     4089    4096           13500 151                        2  IMSV.MC1S5P01
FC2DAP01 OSAM               8192    8192                                        4,442  IMSVS.MC2DAP01
FC2S1P01 VSAM KSDS  LSR       24    4096           13500 151                        7  IMSV.MC2S1P01
FC2S1P01 VSAM INDEX LSR     4089    4096           13500 151                           IMSV.MC2S1P01
FC2S2P01 VSAM KSDS  LSR       24    4096           13500 151                       24  IMSV.MC2S2P01
FC2S2P01 VSAM INDEX LSR     4089    4096           13500 151                        2  IMSV.MC2S2P01
FC2S3P01 VSAM KSDS  LSR       32    4096           13500 151                       11  IMSV.MC2S3P01
```

The I/O Facility Utilization Summary report (Figure 5-13 on page 5-8) summarizes I/O access by device, volume, and ddname. In this example, the five data sets reside on different units, making access more efficient. For more information about I/O activity on each cylinder, examine the DASD Usage by Cylinder reports.

Figure 5-13. I/O Facility Utilization Summary Report

```
                                  ** I/O FACILITY UTILIZATION SUMMARY **

 UNIT     DEVICE     CACHE  VOLUME DDNAME             RUN TIME PERCENT       RUN TIME HISTOGRAM  MARGIN OF ERROR:  3.61%
  NO       TYPE       ELIG    ID                  I/O  SOLO      TOTAL      .00       1.00       2.00       3.00       4.00

 296      DA 3390          DBA044    CWPDAP01           .09     31.55       .+++++++++++++++++++++++++
 296      DA 3390          DBA044    HC1DAP01           .00      2.66       .++
                                                       -----     -----
UNIT  296 TOTALS                                        .09     34.21

 3DD      DA 3390          DBA127    CWADAP01           .02     20.19       .++++++++++++++++

 3D8      DA 3390          DBA078    CRNDAP01           .00       .32       .

 3D9      DA 3390          DBA087    CRZDAP01           .06     43.50       .++++++++++++++++++++++++++++++++++
 3D9      DA 3390          DBA087    CWRDAP01           .00       .12       .
 3D9      DA 3390          DBA087    CW2S3P01           .00      1.66       .+
 3D9      DA 3390          DBA087    CW2S3P01 INDEX     .00       .12       .
 3D9      DA 3390          DBA087    CW6S5P01           .00      1.43       .+
 3D9      DA 3390          DBA087    CW6S5P01 INDEX     .00       .04       .
                                                       -----     -----
UNIT  3D9 TOTALS                                        .06     46.87

 30C      DA 3390          DBA193    FC2DAP01           .05     51.21       .+++++++++++++++++++++++++++++++++++++++++

 34E      DA 3390          DBA036    FC1DAP01           .06     41.98       .+++++++++++++++++++++++++++++++++
 34E      DA 3390          DBA036    FC9S1P01           .00       .04       .
 34E      DA 3390          DBA036    FC9S1P01 INDEX     .00       .05       .
                                                       -----     -----
UNIT  34E TOTALS                                        .06     42.07
```

Identifying CPU Activity in a DLISAS

The Transaction Summary report (Figure 5-14 on page 5-9) shows the distribution of CPU usage among function-specific pseudo-transactions within the region. Each pseudo-transaction appearing in the Transaction Summary report is described in more detail in the Transaction Usage by Control Section report.

In the transaction reports for DLISAS regions, STROBE assigns CPU time to pseudo-transactions representing the IMS ITASK being executed. The STROBE-assigned pseudo-transaction names are made up of a three-character task identifier followed by a “/”, concatenated with characters four through seven of the active module name. (For a list of common ITASK identifiers, see “Transaction Identification for IMS System Regions” on page 1-8.)

Figure 5-14. Transaction Summary Report

```
                                                  ** TRANSACTION SUMMARY **
 TRANSACTION    FUNCTION              TRANSACTION   AVERAGE     % CPU TIME    CPU TIME HISTOGRAM  MARGIN OF ERROR:  6.07%
    NAME                                 COUNT      SERVICE     SOLO   TOTAL  .00       25.00      50.00      75.00    100.00
                                                    TIME
  DLI/****      COMMON SERVICES TASK          19       0.22      .00    1.07  .+
  DLI/CE        COMMON SERVICES TASK          10       1.29      .00    2.14  .++
  DLI/DAVE      COMMON SERVICES TASK           5       0.31      .00     .53  .
  DLI/DBAU      DB-DATA SHARE AUTH REQ.      109       0.46      .00    3.21  .++++
  DLI/DBCT      DB-CONTROL BLOCK SERVICE      11       0.33      .00    1.07  .+
  DLI/DBHO      ISAM/OSAM BUFFER HANDLER     107       0.19      .00    7.49  .+++++++++
  DLI/DDLE      DB-LOGICAL, LOAD/INSERT      319       0.09      .00    1.07  .+
  DLI/DHDS      DL/I SPACE MANAGER            28       0.39      .00    1.60  .++
  DLI/DLDO      DL/I LOGICAL DEL/REPLACE     634       0.17      .00   12.83  .+++++++++++++++++
  DLI/DLOC      DB-DATABASE OPEN/CLOSE        93       0.21      .00    1.60  .++
  DLI/DLRO      DB-LOGICAL RETRIEVE          317       0.13      .00    4.81  .++++++
  DLI/DVBH      DB-BUFFER HANDLER ROUTER      41       0.76      .00    4.28  .+++++
  DLI/DVSM      DB-VSAM INTERFACE            112       0.35      .00    7.49  .+++++++++
  DLI/DXMT      DB-INDEX MAINTENANCE           7       0.84      .00    1.60  .++
  DLI/FXC1      DB-EXC. CNTL. ENQ/DEQ PI     128       0.16      .00    1.60  .++
  DLI/HDC4      DB-GENERAL HDAM RANDOMIZ       5       0.27      .00     .53  .
  DLI/IDSP      EXTENDED COMMON AREA         212       1.19      .00    9.63  .++++++++++++
  DLI/MCIH      COMMON SERVICES TASK          19       0.13      .00     .53  .
  DLI/NCD       COMMON SERVICES TASK          58       0.12      .00    2.14  .++
  DLI/RDBL      DB-DB CHANGE LOGGING          19       0.33      .00    3.21  .++++
  DLI/SBIL      SUPERVISORY FUNCTIONS         97       0.08      .00    1.07  .+
  DLI/VESC      SCHEDULE SERVICE              17       0.13      .00     .53  .
  DLI/019B      BSAM READ/WRITE ALL DEVS      13       0.19      .00     .53  .
  DLI/019L      VSAM RECORD MANAGEMENT      1021       0.88      .00   29.41  .++++++++++++++++++++++++++++++++++++++++
                                           -----      -----    -----   -----
PROGRAM DFSMVRCO TOTALS                     3401       0.38      .00  100.00
```

In this example, transaction DLI/019L VSAM RECORD MANAGEMENT is responsible for most of the CPU time. For more information, examine the Transaction Usage by Control Section report for this transaction.

Note: Since the percentage of CPU time used during the measurement session reported on in **Figure 5-10 on page 5-6** is relatively small (1.87%), this report should be used to give an overall picture of the work done in the region rather than to identify major performance improvement opportunities.

The Transaction Usage by Control Section report (Figure 5-15) shows, for each IMS pseudo-transaction, the CPU time spent in each module executed to perform the service function represented by the pseudo-transaction. In this example, all of the CPU time was spent in one VSAM module.

Figure 5-15. Transaction Usage by Control Section Report

```
                                          ** TRANSACTION USAGE BY CONTROL SECTION **

TRANSACTION DLI/019L          COMMON SERVICES TASK

 MODULE   SECTION                                   CPU TIME PERCENT      CPU TIME HISTOGRAM  MARGIN OF ERROR:  7.17%
  NAME     NAME   COMPRESSED    FUNCTION              SOLO     TOTAL      .00       7.50      15.00      22.50     30.00

 .VSAM    IDA019L1          VSAM RECORD MANAGEMENT     .00     29.41      .++++++++++++++++++++++++++++++++++++++++
                                                     -----     -----
TRANSACTION DLI/019L  TOTALS                           .00     29.41
```

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