Parallel Sysplex Performance Healthcheck Case Study: DMdata/Danske Data

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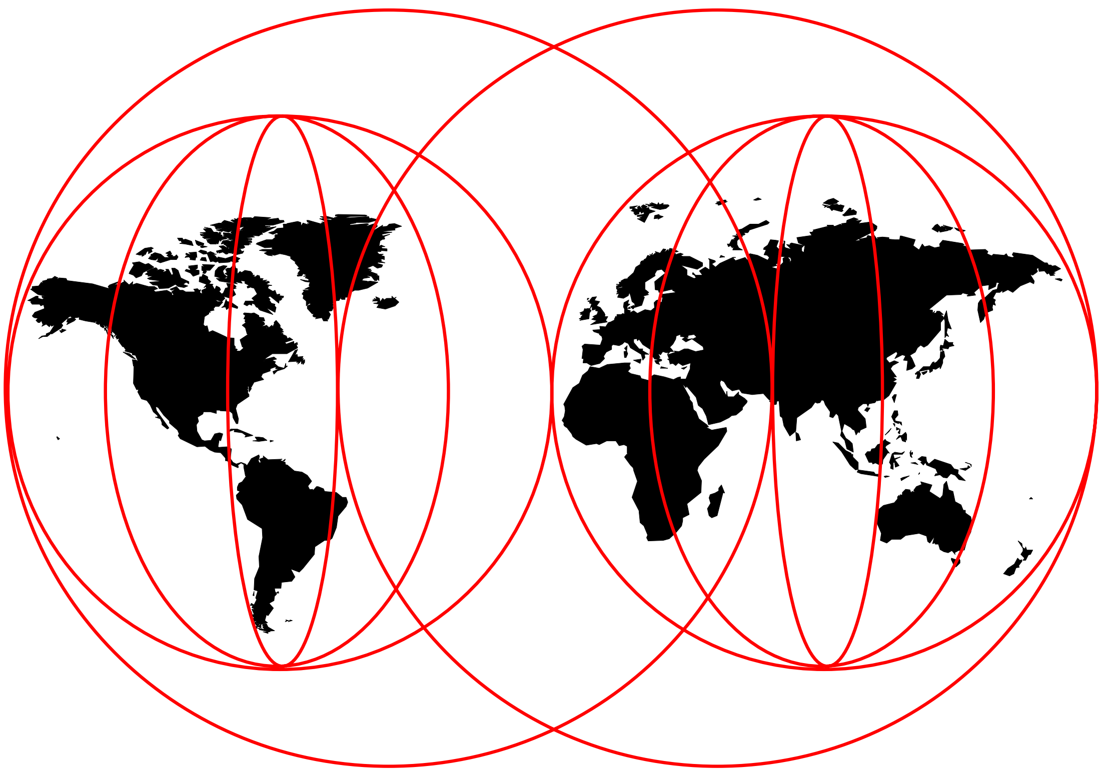

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July 1999

Take Note!

Before using this information and the product it supports, be sure to read the general information in Appendix D, "Special Notices" on page 83.

First Edition (July 1999)

This edition applies to

Program Name, Program Number	Version, Release Number
DB2 for MVS/ESA V4, 5695-DB2	4.1

for use with the:

Program Name	Version, Release Number
OS/390, 5645-001	1.3

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Preface

This redbook presents the results of a Parallel Sysplex performance health check carried out at a Danish IBM customer, DMdata/Danske Data. This edition applies to DB2 for MVS/ESA Version 4 Release 1.

The various aspects of Parallel Sysplex performance and the reports used to investigate it are provided, together with recommendations and capacity estimates.

The book provides MVS system programmers, DB2 system programmers, and performance and capacity analysts with information regarding a performance health check of a production Parallel Sysplex environment.

Some knowledge of Parallel Sysplex concepts and implementation, together with general performance practices, are assumed.

The Team That Wrote This Redbook

This redbook was produced as part of a customer service project by Henrik Thorsen of IBM Denmark.

The following people have provided valuable input for this project:

- Poul Andersen - DMdata
- Jes Jessen - DMdata
- Poul Søe Pedersen - DMdata
- Further thanks to my IBM colleagues: Svend Erik Bach, Mike Cox, Luiz Fadel, Keith George, Gary King, Gopal Krishnan, Frank Kyne, Hans Høy Nielsen, Carsten Lund Rasmussen, Beth Somers, Keld Teglgaard, Søren Understrup, John Watson and Maryela Weihrauch.

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Chapter 1. Introduction

This document and the associated project seek to analyze the Parallel Sysplex production environment in DMdata.

DMdata is an outsourcing company in Denmark that was formed in March 1997 by merging the IT operations of Den Danske Bank and Mærsk Data AS. Mærsk Data AS was a part of the A.P. Møller Group. DMdata also provides services to companies in the supermarket, retail, agriculture, health care, manufacturing, and insurance industries. DMdata customers include Dansk Supermarked with Netto, HS, LEC, Føtex, Bilka and A-Z., Danica Forsikring, Nordisk Kabel & Tråd, and Arbejdsmarkedsstyrelsen.

DMdata is the largest IT service provider in the Nordic area. For more information refer to:
`http://www.dmdata.dk`

DMdata runs more than 50 OS/390 images, spread across two sites, Brabrand and Ejby, which are 300 km apart. At the time of this study, there were two sysplexes (test and production) in Brabrand, and one sysplex in Ejby. As experience with data sharing is gained, it is expected that DMdata will implement data sharing on a larger number of their systems.

This study concentrates on the sysplexes providing service to one of DMdata's customers. (Other DMdata data sharing sysplexes service other customers. These and other systems are not included in this study.)

This redbook is based on data gathered from the two sites on April 8, 1998. It highlights potential bottlenecks and provides a number of recommendations.

All data required for this analysis is based on standard IBM-supplied tools, presently installed at DMdata. Most recommendations are based on observations for this one-day view. Most, if not all, recommendations should be generally applicable. However, if the system activity on April 8 is not representative of a normal business day, the observations may be somewhat affected.

The recommendations generally fall into two categories:

1. Recommendations for Availability

   These can be subdivided into:

   - Proposed changes to software subsystems
   - Proposed changes to hardware configurations
   - Proposed changes to CF structure placement or sizing

2. Recommendations for Performance

   These can be subdivided into:

   - Proposed changes to software subsystems
   - Proposed changes to hardware configurations
   - Proposed changes to CF structure placement or sizing

Before examining the details related to this study, let us briefly summarize the findings.

1.1 Management Summary

This study, based on detailed measured data for April 8, 1998, concludes that DMdata has a well-designed and acceptably performing Parallel Sysplex. Approximately one man-month of DMdata and IBM resources were involved in this study. Without the effort of Jes Jessen and many of his colleagues from DMdata, this project would not have been possible.

The study did not reveal any major bottlenecks. While some constraints were found, nearly all of these can be fixed by redefining system parameters, as indicated within this redbook.

The cost of data sharing in Danske Data systems was measured at approximately 4% of the total sysplex resources used in Ejby. The corresponding cost in Brabrand was even less, just 2%, mostly due to a smaller degree of data sharing.

The capacity used in the Ejby production data sharing group did not exceed 600 MIPS, and the corresponding load in Brabrand did not exceed 500 MIPS. The total available capacity IBM could provide in a single sysplex in each of the centers exceeds 32,000 MIPS using technology announced at the time of the study (IBM 9672 Generation 5). In addition, IBM expects this total capacity to continue to double every 12 to 24 months as it has since the first generations of CMOS CPCs were available.

By implementing Parallel Sysplex, DMdata/Danske Data eliminates capacity constraints inherent to single IBM systems, not only in terms of CPU capacity but also virtual and processor storage. None of these resources were found to be constrained in this Parallel Sysplex analysis.

DMdata/Danske Data has, by establishing DB2 data sharing groups, laid the groundwork for a continuously available S/390 platform for applications and data. The DB2 and IMS versions required for data sharing have further significant improvements for data availability. The IBM Geoplex service offering (Geographically Dispersed Parallel Sysplex: the S/390 Multi-site Application Availability Solution) further addresses the data availability issue by mirroring data across sites.

Today *static* workload balancing is possible across CPCs at DMdata/Danske Data. This is used in peak situations by DMdata/Danske Data, where available processing capacity on non-production system is used by workloads accessing shared production databases.

IBM recommends that DMdata/Danske Data keep implementing and enhancing the Parallel Sysplex as follows:

- Short term (for example, within the next year)

  Small adjustments, such as those recommended in this redbook, may be carried out. More systems may be added to the data sharing groups where feasible in terms of flexibility and capacity.

  The next version of DB2 should be implemented, since it provides more flexibility, higher availability and improved performance. Of particular interest, in relation to improved availability, is the support for duplex Group Buffer Pools that has been retrofitted from DB2 V6 back to DB2 V5 and were available in November 1998. DB2 V5 should be installed member by member, thus preserving application availability. Similarly, OS/390 2.6 should also be installed in this way.

DMdata/Danske Data is encouraged to implement other exploiters of Parallel Sysplex to obtain further benefits. A candidate list includes VTAM Generic Resources, RACF databases, JES2 checkpointing, Tape Sharing, System Logger and XCF signalling use by VTAM, TCP/IP, and so on. IBM strongly recommends enabling WLM in goal mode to obtain the benefits of dynamic workload balancing. This provides effective control of new workload types, like Web based work, DB2 stored procedures, business intelligence and so on, and is a prerequisite for advanced exploitation of these facilities.

DMdata/Danske Data is encouraged to continue its involvement in activities such as the "Parallel Sysplex Leaders Council" and the sysplex operator certification process. Information about this process may be found at: `http://www.s390.ibm.com/products/pso/`

Besides obtaining timely information, this enables DMdata/Danske Data to influence IBM development plans in the entire Parallel Sysplex area.

- Longer term

  By gradually eliminating system affinities from production workloads and by implementing *dynamic* workload balancing mechanisms, DMdata/Danske Data will obtain a higher degree of data availability than experienced today.

All in all, robustness in the form of high availability from DMdata/Danske Data business applications to business data is within reach. This is true, even if individual systems experience scheduled or unscheduled outages.

1.2 Project Description

This redbook is based on detailed measurements of Danske Data systems both in Ejby and Brabrand. Input data includes RMF (Postprocessor and Monitor III), CF Monitor (screen captures), and DB2PM data as well as log information based on operator commands captured on various systems.

Data was captured on Wednesday, April 8th from around 10:00 till 16:00. This day was the last day before Easter vacation, and therefore the bank experienced a higher-than-normal peak in the online load. For a more complete listing of the input data, refer to Appendix A, "Input Data Summary" on page 43.

The primary emphasis is on the production systems in Ejby. Of specific interest is the way the production DB2 data sharing group performed.

Chapter 2. DMdata/Danske Data Configuration

This chapter contains short descriptions and illustrations of the Parallel Sysplex configurations in both Ejby and Brabrand. Ejby and Brabrand are approximately 300 km apart and constitute two separate Parallel Sysplexes.

Selected DB2 transactions applied to the databases at each center are mirrored to the other site asynchronously using software developed by Danske Data.

2.1 Ejby Systems Overview

This section describes and analyzes data from three systems in Ejby. Other systems were active in the sysplex, but as they were not in data sharing mode, and not using the CFs at that time, they were not included in this analysis.

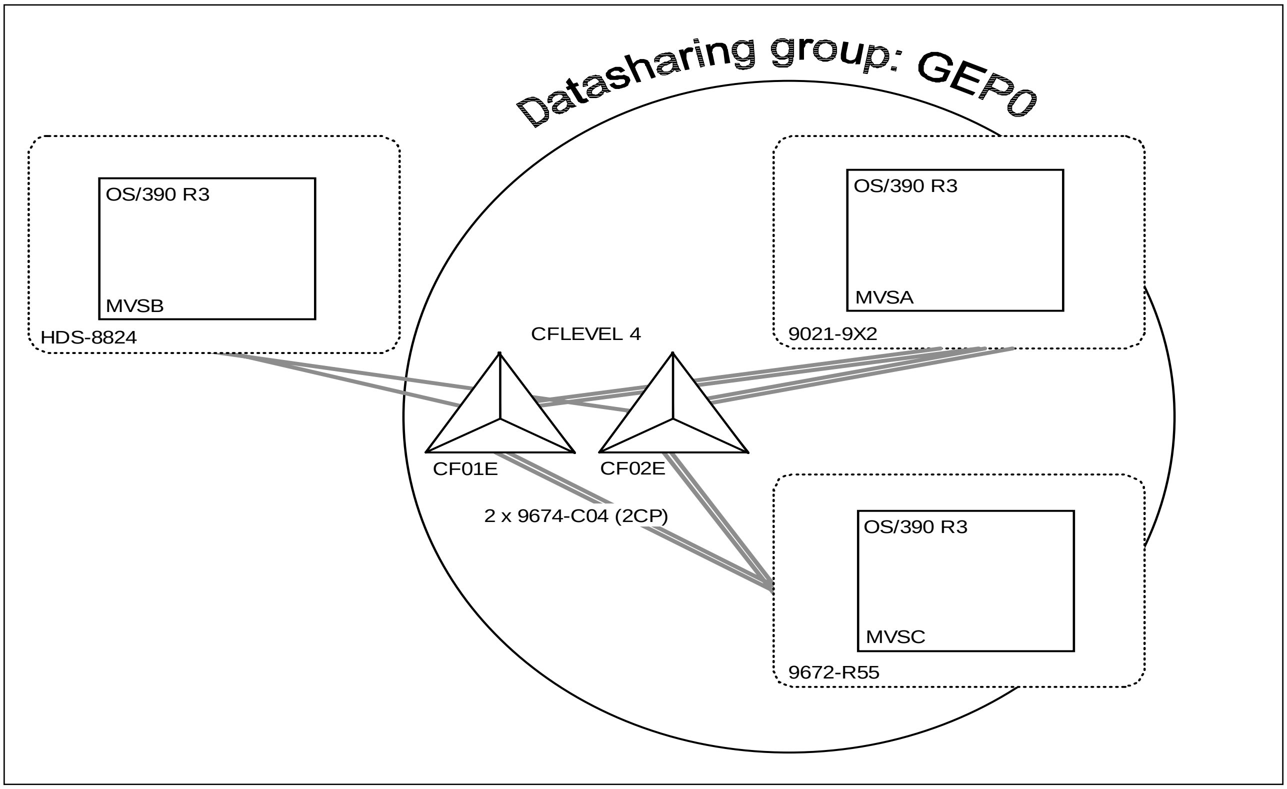

Figure 1. Ejby: Parallel Sysplex Configuration

The systems included in this analysis are shown in Figure 1 and are as follows:

- MVSA is the main production system for the bank branches and ATMs. This system operates in an LPAR on a 9021-9X2.
- MVSB is primarily a development and test system. This system operates in an LPAR on a HDS-8824.
- MVSC is primarily an “offload” system for MVSA. This system operates in an LPAR on a 9672-R55.

Note that at the time of publication, all of these boxes were upgraded or replaced with a mix of Generation 5 and 6 IBM 9672 CPCs. Also, systems have been migrated to OS/390 V2R6 and DB2 V5.

2.2 Ejby Parallel Sysplex Overview

Each of the CPCs mentioned is connected to a set of CFs called CF01E and CF02E. Each CPC is connected to each CF via two CF links, except for the single CF link connections between the HDS-8824 and the CFs. All links use single-mode fibers. The CF links are HiPerLink-attached to the 9672s, but not to the 9674s.

MVSA and MVSC are both members of a production DB2 data sharing group called GEP0. Only MVSA and MVSC are analyzed further.

All systems are part of a GRS complex, in ring mode. All systems have implemented generic resources and have access to the ISTGENERIC CF structure.

An overview of the sysplex functions in Ejby is provided in Table 1.

Table 1. Ejby: Sysplex Functions by System

Facility	CF Structure	MVSA	MVSB	MVSC
DB2 Data Sharing	DSNGBP0_LOCK1,...	√		√
Generic Resources	ISTGENERIC	√	√	√

Table 2 and Figure 2 on page 7 provide information about the CPU load on MVSA, MVSC, CF01E and CF02E. The information is based on 10-minute RMF interval reports.

Both the processor and CF CPU Utilizations are relatively constant throughout the day, as indicated by the relatively flat curves in Figure 2 on page 7.

Table 2. Ejby: Percent CPU Load on Production Systems and CFs. (9:00 to 15:00 on April 8)

System	Average CPU Load	Peak CPU Load (10 min. Interval)	Peak CPU Load (10 sec. Interval)
MVSA	72	84	100
MVSC	75	85	100
CF01E	6	10	56
CF02E	6	8	57

Observe that the column headed *Peak CPU Load (10 min. Interval)* in Table 2 contains the utilization from the busiest 10-minute interval found during the day. If the measurement period was shorter, the corresponding peak CPU load figures would be higher. For the MVSA and MVSC systems, the maximum load would be 100%. For the CF01E and CF02E CFs, the peak (based on samples every 10 seconds during the day) is 56% and 57% CPU utilization. Most likely these (few) intervals showing higher CF CPU consumption are during DB2 V4 GBP checkpoint processing, which occurs every 8 minutes by default.

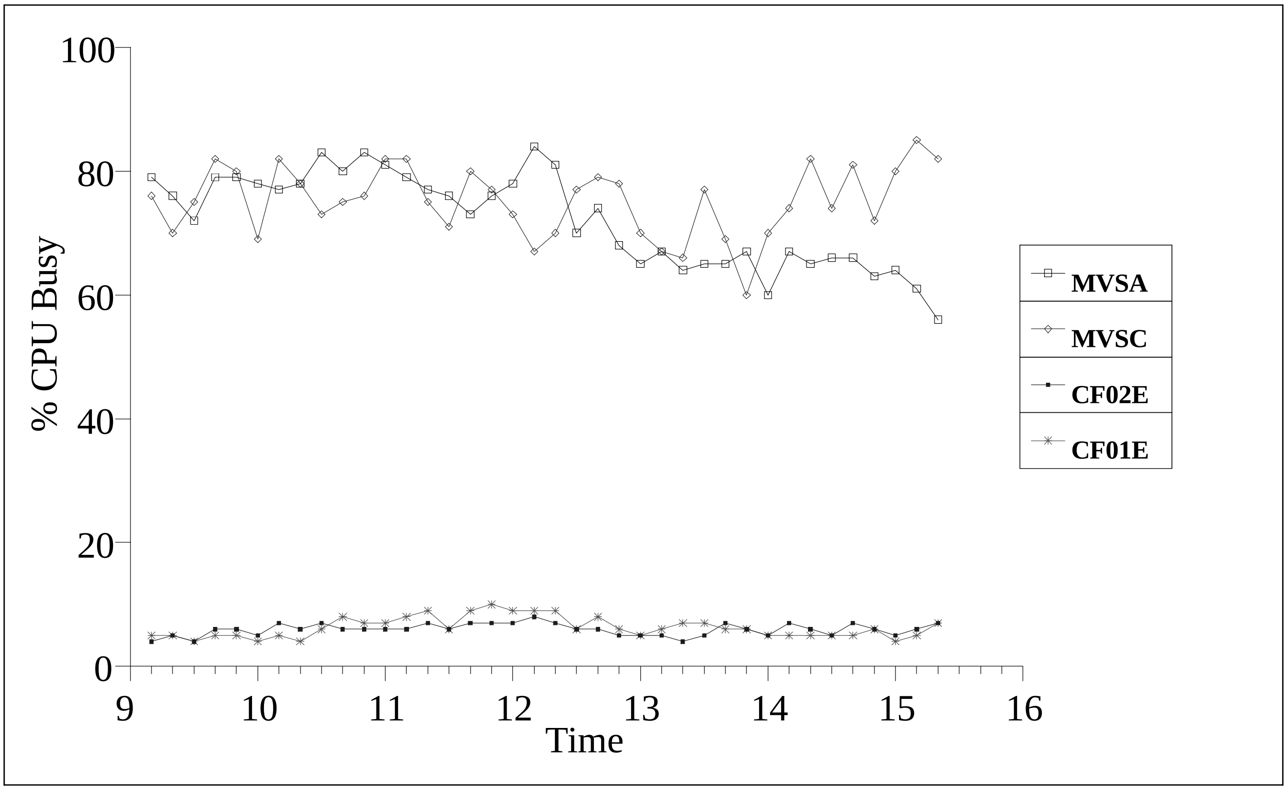

Figure 2. Ejby: CPU Load on Production Systems. (9:00 to 15:00 on April 8)

It can be concluded that no processing constraints existed during the measurement interval for either CPC or CF CPU resources. The spike in activity for the CF related to DB2 GBP checkpoint processing will to a large extent be eliminated in DB2 V5 (and associated XES enhancements). On the measurement day, DB2 GBP checkpoint processing took place every 8 minutes (which is the default value specified in DB2). The effect of CF CPU activity spikes is not shown in the figure, which is based on 10-minute intervals.

Recommendation for Performance

It is recommended that the latest DB2 Version be installed. Items of specific interest to DMdata are the enhanced GBP checkpoint processing and the enhanced CF structure recovery functions. There are also performance benefits to be obtained through the use of the enhanced utilities which have been retrofitted to DB2 V5 from DB2 V6, via APARs PQ19897, PQ19077, and PQ23219.

2.3 Ejby Parallel Sysplex Details

In this section we review the CF configuration and the CF structure activity of the systems in Ejby.

2.3.1 Ejby CF Configuration

Table 3 shows the name, type, and size of the structures in each of the two CFs. The production CF structures are shown in bold.

Table 3. Allocated CF Structures in Ejby (CF01E and CF02E)

CF	Structure name	Type	Size KB
CF01E	DSNGED0_GBP0	Cache	40192
	DSNGED0_LOCK1	Lock	16128
	DSNGED0_SCA	List	32000
	DSNGEP0_GBP4	Cache	320000
	DSNGEP0_LOCK1	Lock	128000
	DSNGER0_GBP0	Cache	8192
	DSNGER0_LOCK1	Lock	16128
	DSNGER0_SCA	List	32000
	DSNGES0_GBP0	Cache	32000
	DSNGES0_GBP1	Cache	8192
	DSNGES0_GBP2	Cache	8192
	DSNGES0_GBP4	Cache	4096
	DSNGES0_GBP5	Cache	4096
	DSNGES0_GBP7	Cache	4096
	DSNGES0_LOCK1	Lock	16128
	DSNGES0_SCA	List	32000
CF02E	**DSNGEP0_GBP0**	Cache	64000
	DSNGEP0_GBP1	Cache	512000
	DSNGEP0_GBP2	Cache	64000
	DSNGEP0_GBP32K1	Cache	6144
	DSNGEP0_GBP5	Cache	128000
	DSNGEP0_GBP7	Cache	16128
	DSNGEP0_SCA	List	65024
	DSNGET0_GBP0	Cache	20224
	DSNGET0_GBP1	Cache	8192
	DSNGET0_GBP32K1	Cache	4096
	DSNGET0_GBP4	Cache	4096
	DSNGET0_GBP5	Cache	4096
	DSNGET0_LOCK1	Lock	16128
	DSNGET0_SCA	List	32000
	ISTGENERIC	List	5120

Figure 3 on page 9 shows two of the production CFs. Currently allocated and active production structures are shown.

Other CF structures were defined in the CFRM policy but were not allocated at the time. The active CFRM policy was POCFRM01.

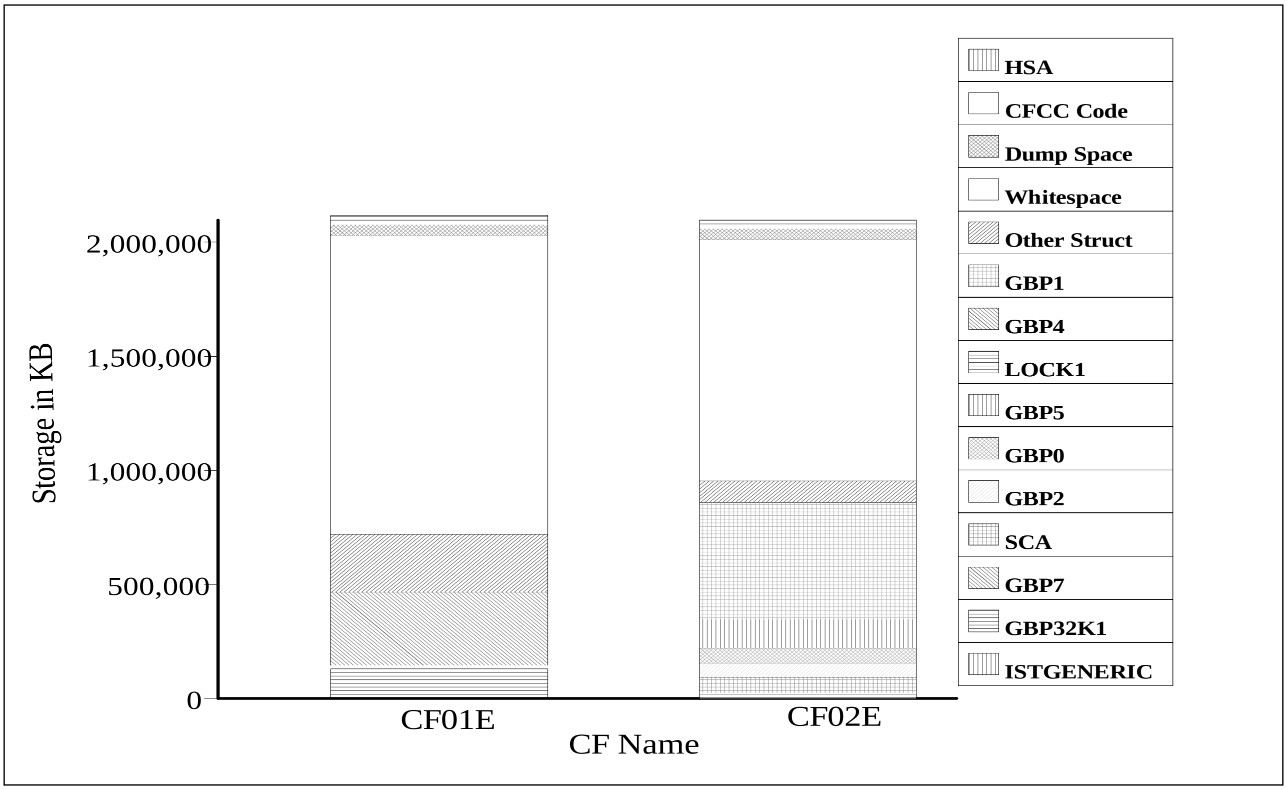

Figure 3. Ejby: CF Layout

Figure 3 shows the storage usage in the two CFs. As you can see, enough “white space” (available CF storage where no structures currently reside) exists in both CFs to accommodate CF structure rebuild in case of both planned and unplanned CF reconfiguration.

A discussion of CF structure sizing and placement is provided in the detailed CF structure evaluation in Chapter 3, “CF Detailed Observations” on page 19.

2.3.2 Ejby CF Structure Activity

Figure 4 on page 10 and Figure 5 on page 11 show the CF request rates serviced by the two CFs in Ejby. Note that production CF structures with virtually no CF requests are omitted from the figures. Further observe that, due to their low numbers, non-production CF requests are omitted from the figures for clarity. Each bar represents the average request rates on a per structure and system basis.

During the measurement interval (10:54 to 14:32 on April 8) approximately 27.6 million CF requests were serviced by CF01E and CF02E. Of these, approximately 25.0 million CF requests reflect CF production structures as outlined in Table 4 on page 10 and Table 5 on page 11. Approximately 11.8 million production CF requests were serviced by CF01E and 13.2 million CF requests were serviced by CF02E. These CF requests correspond to CF request rates of approximately 910 and 1020 CF requests per second respectively.

Table 4 on page 10 and Table 5 on page 11 show requests to CF01E and CF02E respectively from all systems to all production CF structures during the measurement interval.

Table 4. Ejby: CF01E Requests (10:54 to 14:32 on April 8)			
System	**Structure Name**	**Structure Activity (total)**	**Structure Activity (avg. rate)**
MVSA	**GBP4**	**2199834**	**170/s**
	LOCK1	**5365360**	**414/s**
	SCA	4773	0 (approx)
MVSB	GBP4	0	0
	LOCK1	0	0
	SCA	0	0
MVSC	**GBP4**	**2069283**	**160/s**
	LOCK1	**2190416**	**169/s**
	SCA	4345	0 (approx)
Total Production		*11.8 Million*	*910/s*

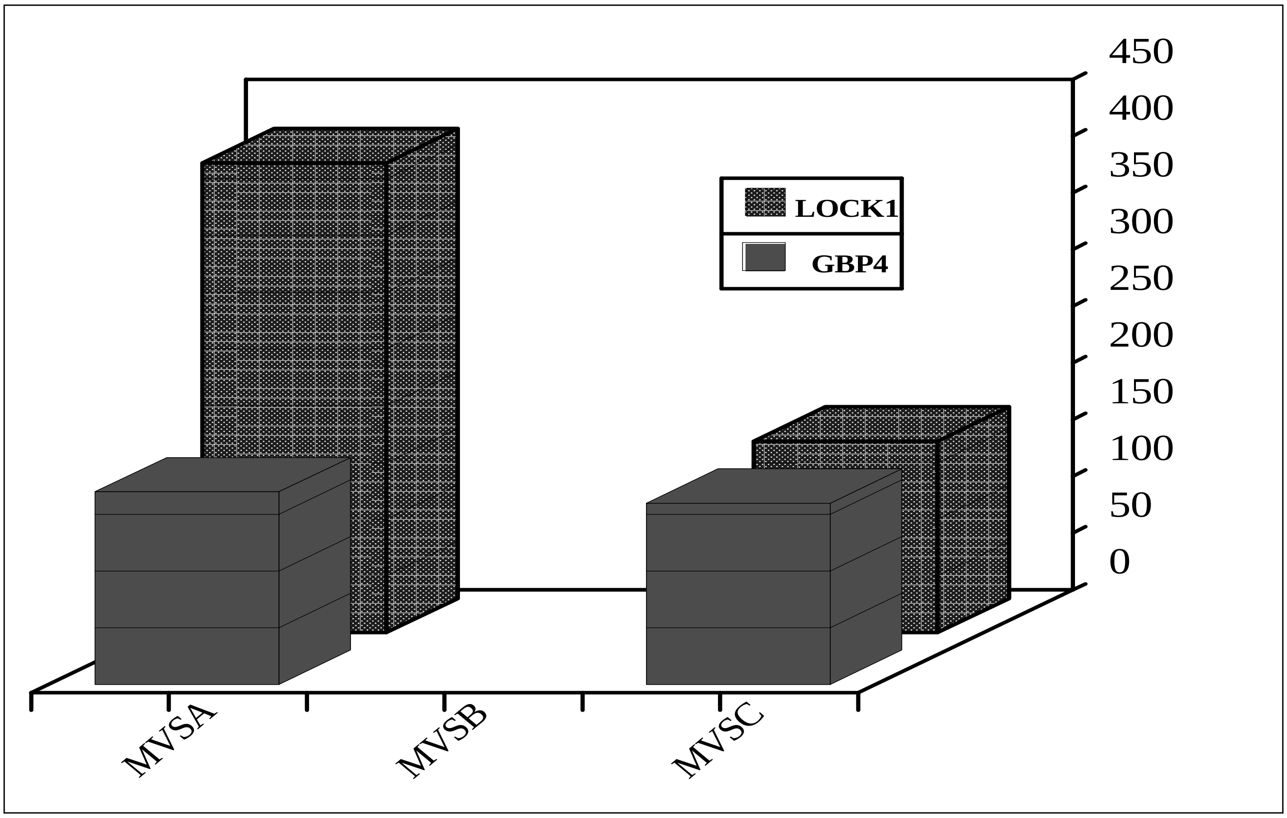

Figure 4. Ejby: CF CF01E Activity by Structure and System. Average CF request rates based on data gathered from 10:54 to 14:32 on April 8.

Since the two systems do not have identical workloads, the relative number of lock requests per GBP access is not the same. MVSC is a lot less lock-intensive, possibly because it has a higher R/W ratio than MVSA. R/W ratios may affect locking because "Explicit Hierarchical Locking" may come into play, but only if one system is doing *NO* updates at all.

MVSA also ran some batch jobs that updated shared DB2 data during the measurements. The presence of batch jobs has the potential to radically change locking characteristics.

Table 5. Ejby: CF02E Requests (10:54 to 14:32 on April 8)

System	Structure Name	Structure Activity (total)	Structure Activity (avg. rate)
MVSA	**GBP5**	**3724311**	**287/s**
	GBP1	**2280571**	**176/s**
	GBP2	**1810415**	**140/s**
	ISTGENERIC	**125347**	**10/s**
MVSB	GBP5	0	0
	GBP1	0	0
	GBP2	0	0
	ISTGENERIC	**43435**	**3/s**
MVSC	**GBP5**	**2436449**	**188/s**
	GBP1	**2500373**	**193/s**
	GBP2	**191435**	**15/s**
	ISTGENERIC	**74939**	**6/s**
Total Production		*13.2 million*	*1020/s*

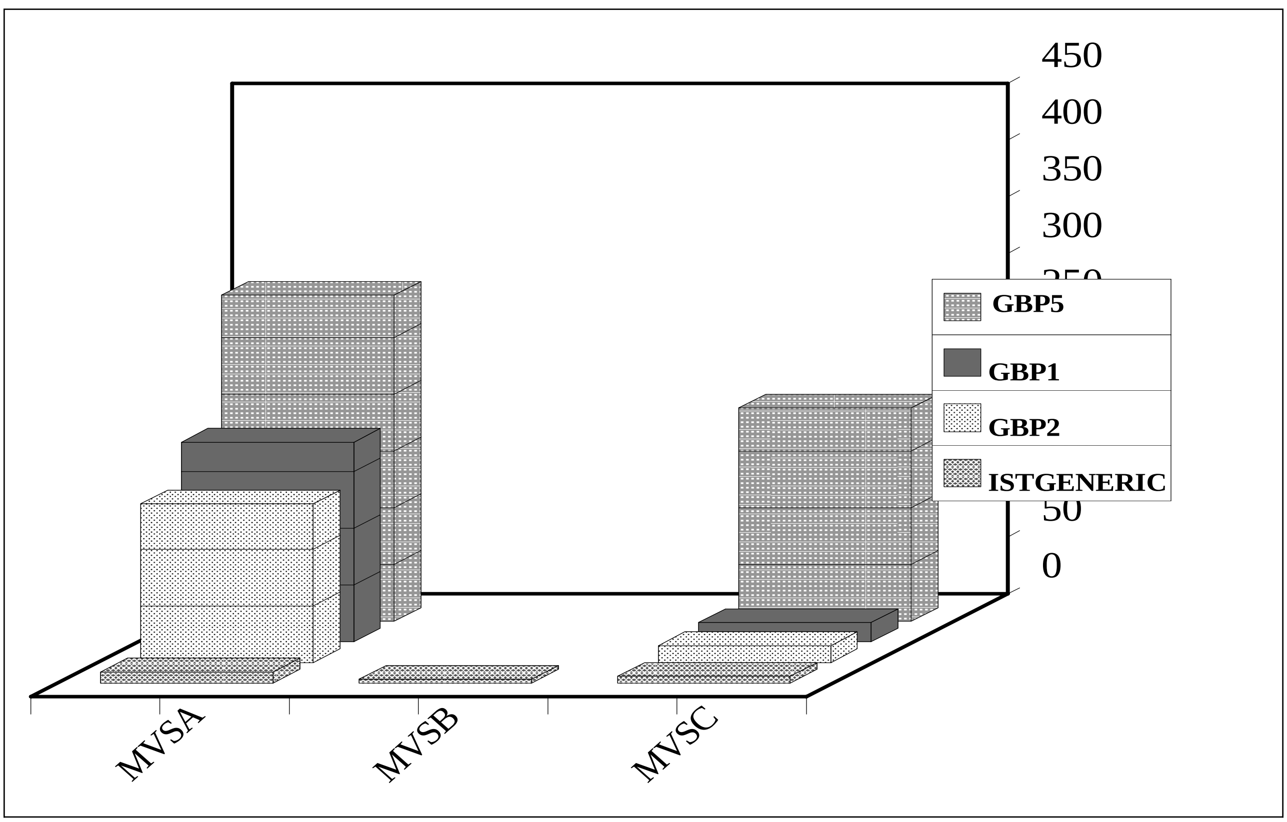

Figure 5. Ejby: CF CF02E Activity by Structure and System. CF request rates based on data gathered from 10:54 to 14:32 on April 4, 1998.

2.4 Brabrand Systems Overview

The Production Parallel Sysplex in Brabrand consists of four systems, as shown in Figure 6 These are:

- ACPU is primarily a development and query system operating in an LP (Logical Partition) on a 9672-RX5 (together with CCPU)
- BCPU is the main production system for the bank branches and ATMs. This system operates as an LP on a 9021-9X2.
- CCPU - primarily a stock exchange and associated dealer system operating in an LP on a 9672-RX5 (together with ACPU).
- FCPU - primarily an “offload” system for BCPU. This system operates in an LP on a 9672-R45.

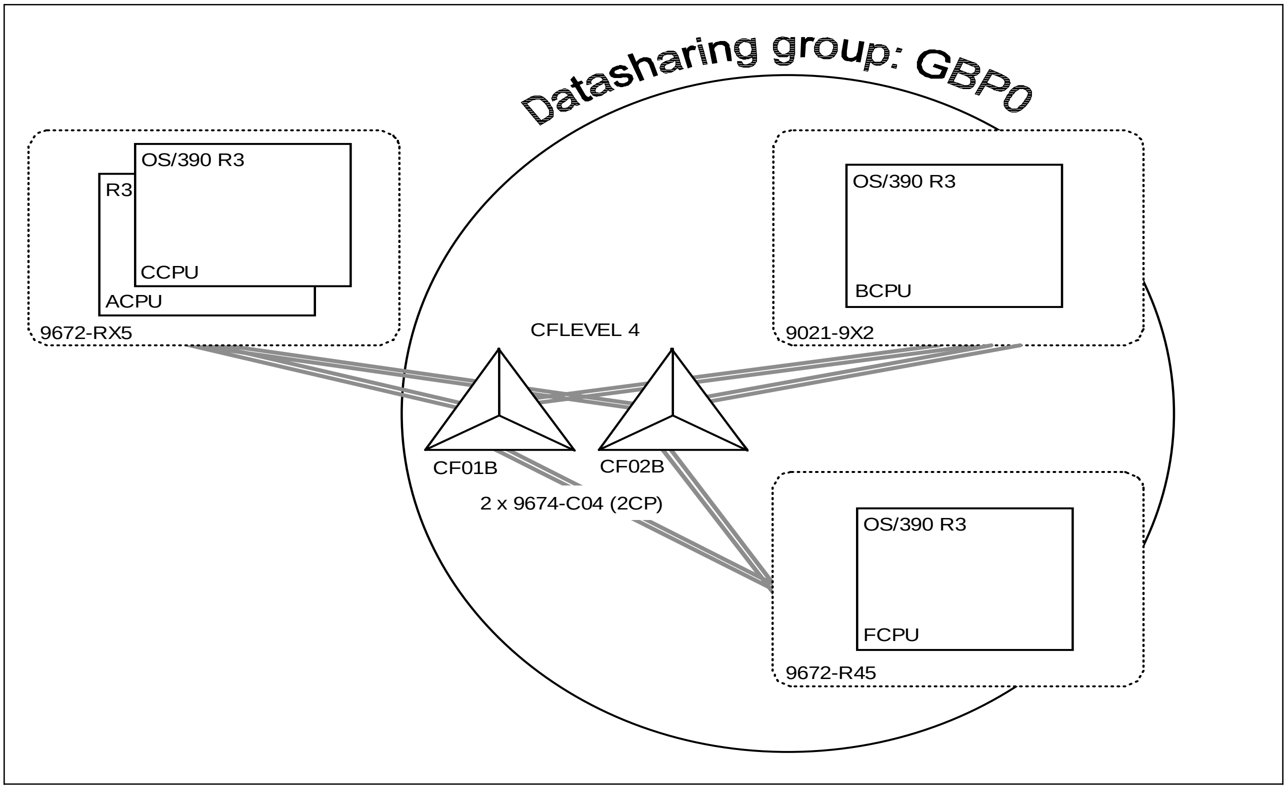

Figure 6. Brabrand: Parallel Sysplex Configuration

Other LPs were active at the time in Brabrand, but they are neither described nor analyzed further in this redbook as they were not part of the Parallel Sysplex.

Note that at the time of publication all these boxes were upgraded or replaced with a mix of Generation 5 and 6 IBM 9672 CPCs. Also, systems have been migrated to OS/390 V2R6 and DB2 V5.

2.5 Brabrand Parallel Sysplex Overview

Each of the CPCs mentioned is connected to a set of CFs called CF01B and CF02B. Each CPC is connected to each CF via two CF links. All CF links are based on single-mode fibers. The CF links are HiPerLinks where possible (all 9672s and 9674s have HiPerLink cards installed).

The systems BCPU and FCPU are members of a DB2 data sharing group called GBP0.

All systems are part of a GRS star configuration; all systems have access to the ISGLOCK CF structure. All systems have access to shared tapes using sysplex sharing (all systems have access to the IEFAUTOS CF structure). The systems ACPU, BCPU and FCPU have implemented generic resources - they have access to the ISTGENERIC CF structure.

The plan is to use ISTGENERIC for DB2 DDF, but this was awaiting APPN definitions at the time of writing. An overview of the sysplex functions in Brabrand is provided in Table 6.

Table 6. Brabrand: Sysplex Functions by System

Facility	CF Structure	ACPU	BCPU	CCPU	FCPU
DB2 Data Sharing	DSNGBP0_LOCK1,...		√		√
GRS Star	ISGLOCK	√	√	√	√
Tape Sharing	IEFAUTOS	√	√	√	√
Generic Resources	ISTGENERIC	√	√		√

2.6 Brabrand Parallel Sysplex Details

In the following section we look at the CF configuration and CF structure activity for the Parallel Sysplex in Brabrand.

2.6.1 Brabrand CF Configuration

Figure 7 on page 14 shows the two production CFs. The currently allocated and active “production” structures are shown. Brabrand has two CFs: CF01B and CF02B.

Table 7 shows the name, type, and size of the structures in each of the two CFs. The production CF structures are shown in bold.

Table 7 (Page 1 of 2). Allocated CF Structures in Brabrand (CF01B and CF02B)

CF	Structure name	Type	Size KB
CF02E	**DSNGBP0_GBP5**	Cache	102144
	DSNGBP0_LOCK1	Lock	128000
	DSNGBP0_SCA	List	64000
	IEFAUTOS	List	4096
	ISTGENERIC	List	5120

Table 7 (Page 2 of 2). Allocated CF Structures in Brabrand (CF01B and CF02B)			
CF	**Structure name**	**Type**	**Size KB**
CF02B	**DSNGBP0_GBP0**	Cache	76032
	DSNGBP0_GBP1	Cache	400128
	DSNGBP0_GBP2	Cache	36096
	DSNGBP0_GBP4	Cache	396032
	DSNGBP0_GBP7	Cache	4096
	ISGLOCK	Lock	131328

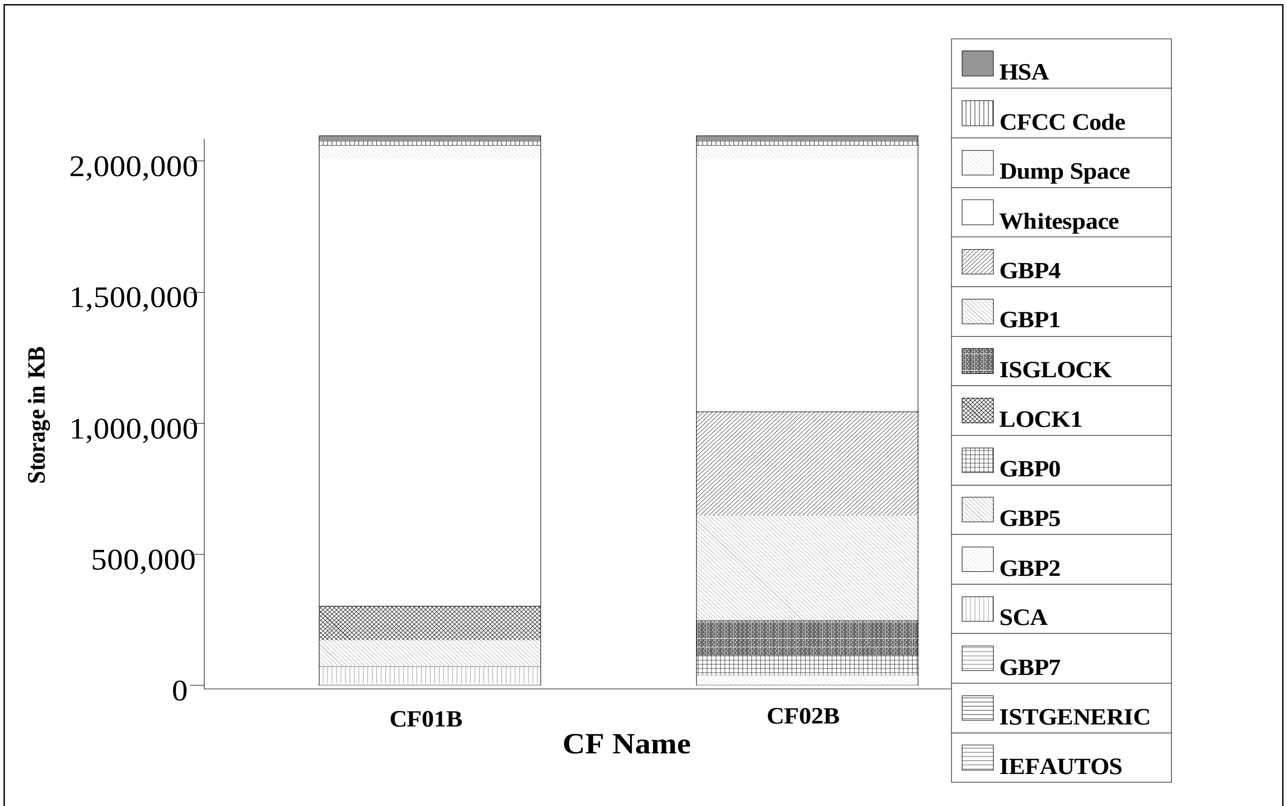

Figure 7. Brabrand: CF Layout

2.6.2 Brabrand CF Structure Activity

Table 8 on page 15 and Figure 8 on page 16 show the CF requests serviced by the CF01B CF in Brabrand. Table 9 on page 17 and Figure 9 on page 18 show the corresponding numbers for the CF02B CF in Brabrand. CF structures with only a small number of CF requests were omitted from the figures. Each bar in Figure 9 on page 18 represents the total number of requests on a per structure and per system basis.

During the measurement interval (10:19 to 14:53 on April 8), approximately 6.1 million CF requests were serviced by CF01B and 7.9 million CF requests were serviced by CF02B. These CF requests correspond to CF request rates of approximately 370 and 480 CF requests per second respectively.

Table 8. Brabrand: CF01B Requests (10:19 to 14:53 on April 8)

System	Structure Name	Structure Act. (total)	Structure Act. (rate)
ACPU	LOCK1	0	0
	GBP5	0	0
	ISTGENERIC	**53054**	**3/s**
	SCA	0	0
	IEFAUTOS	0	0
BCPU	**LOCK1**	**3268839**	**199/s**
	GBP5	**1888202**	**115/s**
	ISTGENERIC	**119881**	**7/s**
	SCA	5347	0
	IEFAUTOS	0	0
CCPU	LOCK1	0	0
	GBP5	0	0
	ISTGENERIC	0	0
	SCA	0	0
	IEFAUTOS	0	0
FCPU	**LOCK1**	**563693**	**34/s**
	GBP5	**121859**	**7/s**
	ISTGENERIC	**50310**	**3/s**
	SCA	4786	0
	IEFAUTOS	0	0
Grand Total		*6.1 Million*	*370/s*

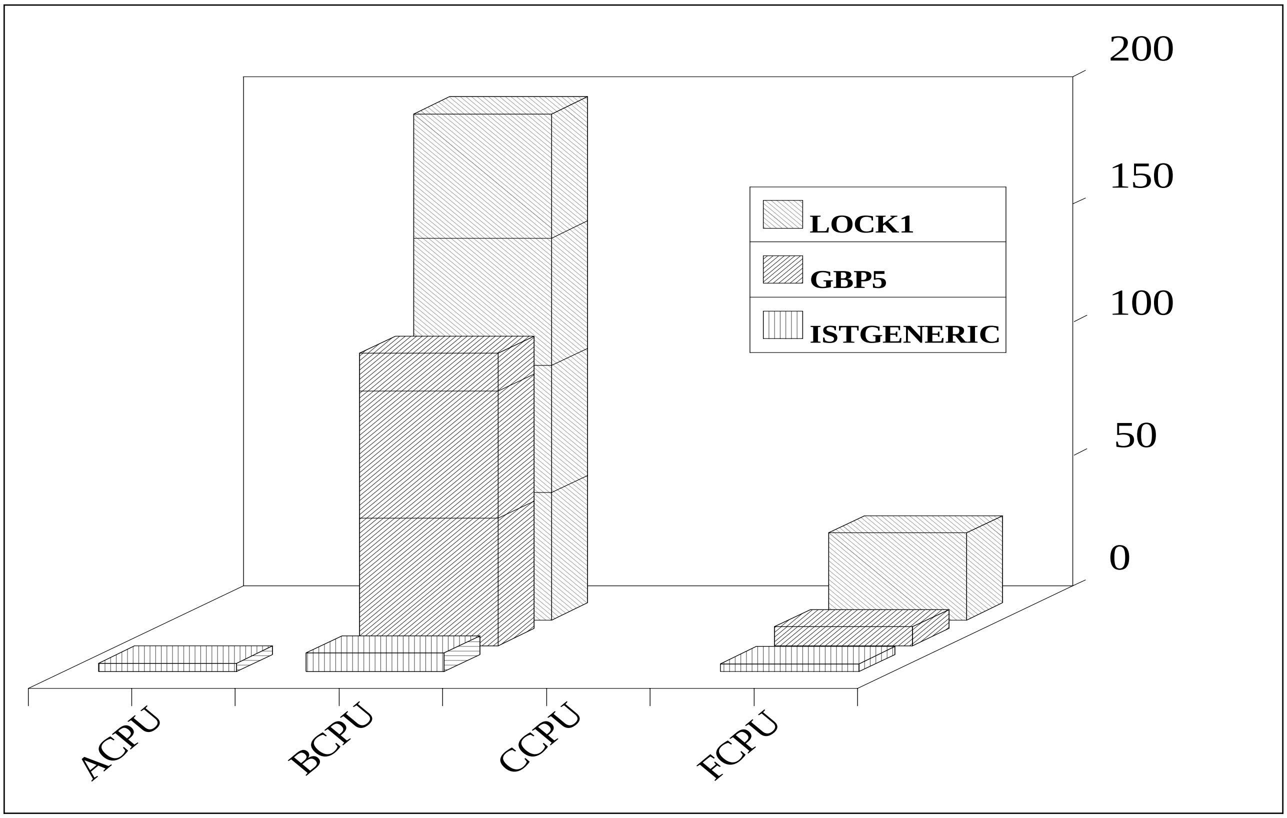

Figure 8. Brabrand: CF CF01B Activity by Structure and System. Average CF request rates based on data gathered from 10:19 to 14:53 on April 4, 1998.

Table 9. Brabrand: CF02B Requests (10:19 to 14:53 on April 8)

System	Structure Name	Structure Act. (total)	Structure Act. (rate)
ACPU	GBP0	0	0
	GBP1	0	0
	GBP2	0	0
	GBP4	0	0
	GBP7	0	0
	ISGLOCK	**2796717**	**170/s**
BCPU	**GBP0**	**18014**	**1/s**
	GBP1	**2210110**	**134/s**
	GBP2	**1298267**	**79/s**
	GBP4	**589058**	**36/s**
	GBP7	1750	0
	ISGLOCK	**585436**	**36/s**
CCPU	GBP0	0	0
	GBP1	0	0
	GBP2	0	0
	GBP4	0	0
	GBP7	0	0
	ISGLOCK	**51777**	**3/s**
FCPU	GBP0	3145	0
	GBP1	**152296**	**9/s**
	GBP2	**30595**	**2/s**
	GBP4	**129888**	**8/s**
	GBP7	3	0
	ISGLOCK	**70181**	**4/s**
Grand Total		*7.9 million*	*480/s*

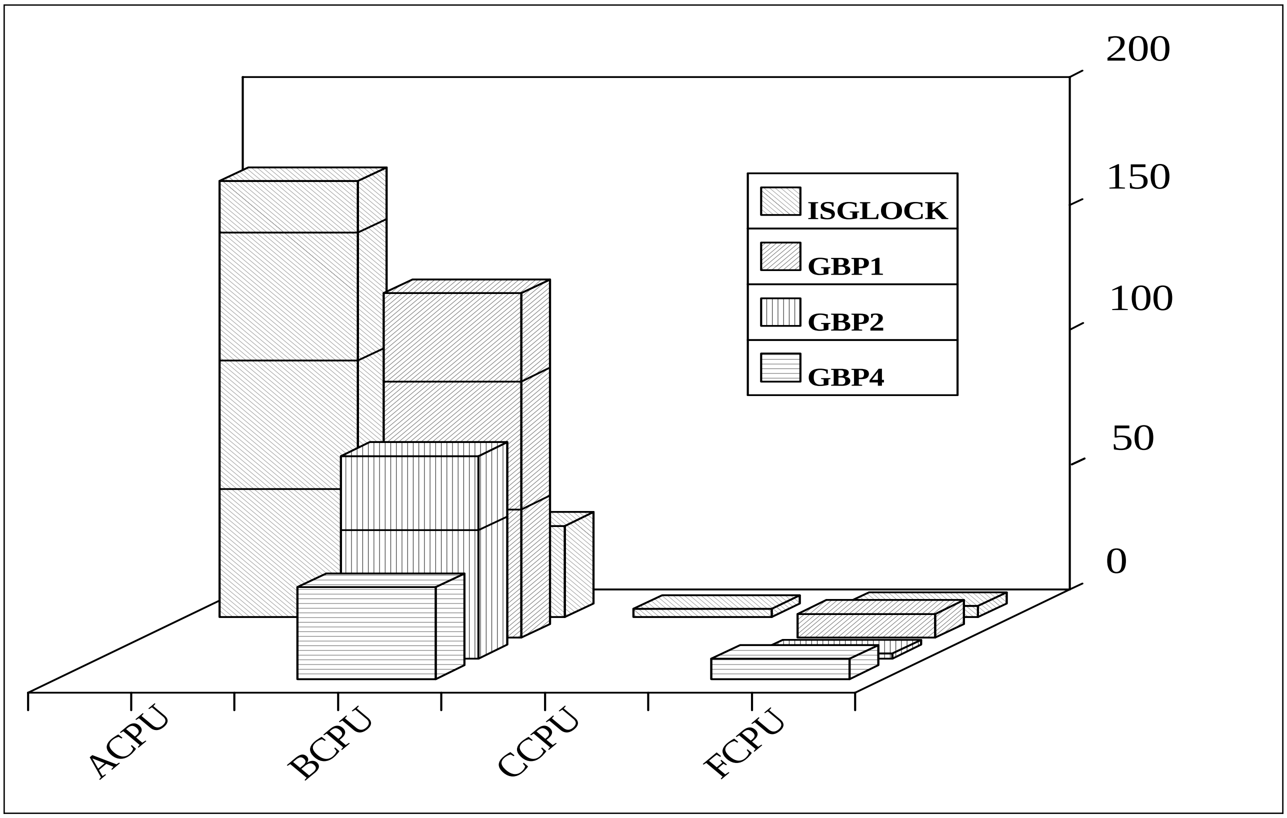

Figure 9. Brabrand: CF CF02B Activity by Structure and System. Average CF request rates based on data gathered from 10:19 to 14:53 on April 4, 1998.

As shown in both Figure 8 on page 16 and Figure 9, most of the shared DB2 activity took place on the system called BCPU, whereas most of the GRS enqueue activity generally took place on the system called ACPU.

Figure 8 on page 16 also suggests that the system called BCPU has a somewhat higher R/W ratio.

Other measurements, which were not conducted within the scope of this project, indicated a significant reduction in total CPU activity after migration to GRS star. The net savings of total CPU capacity consumed across all systems in the Brabrand Parallel Sysplex was of the order of 5%.

Chapter 3. CF Detailed Observations

This chapter discusses CF service times, CF link utilizations, CF structure placement and sizing, and will help you to determine if any bottlenecks exist.

To determine how many CF engines do you need, consider the following:

There are certain “long-running” CF commands (for example, commands that scan through the directory of the GBP cache structure). These long-running commands can tend to monopolize the single engine in a one-engine CF and result in degraded service times for requests that are received while the CF engine is unavailable. In a two-engine CF, this does not occur because while one CP is handling a long-running command, the other can be responsive to other commands that are received.

One of the changes in DB2 V5 is support for a new CF function referred to as time-order-queues. This requires an APAR to DB2, OS/390, and CFLEVEL=5, and greatly reduces the CF processing involved in DB2 GBP checkpointing.

Note that an additional change in CFLEVEL=5 was intended to help address the problem of long-running commands. The CFCC code intelligently “preempts” long-running commands when there are other commands waiting to be serviced.

3.1 CF Service Times

RMF reports CF service times in the CF Activity Report.

In this and the following chapter the annotations (such as **A**) refer to specific fields in RMF or other reports shown in Appendix B, “Sample RMF, CFMON, and DB2PM Reports” on page 45.

3.1.1 Synchronous CF Service Times (Lock Requests)

CF lock requests are always executed synchronously. As shown in Figure 34 on page 66, the *average* response times (9:00 to 19:00) for the DSNGEP0_LOCK1 structure in CF01E are:

- **A** MVSA (9021-711) 99.8 microseconds
- **B** MVSC (9672-G4) 89.0 microseconds.

Similar numbers (**A1**, **A2**, **B1**, and **B2**) were derived for two 10-minute intervals (11:00-11:10 and 14:00-14:10) as shown in 6.2, “Ejby Data Sharing Cost Calculation - Morning” on page 39 and 6.3, “Ejby Data Sharing Cost Calculation - Afternoon” on page 40.

The lock service times are summarized in Table 10.

Table 10. Ejby: RMF Reported Service Time for DB2 Lock Structure in Microseconds

System	Morning	Afternoon	Average
MVSA	101	102	100
MVSC	93	99	90

Sample CF service times for other combinations of sender CPC and receiver CFs are shown in Figure 10 on page 20.

Note: These service times may vary with the load and usage of the CF, as well as the type of connection between the CPC and CF.

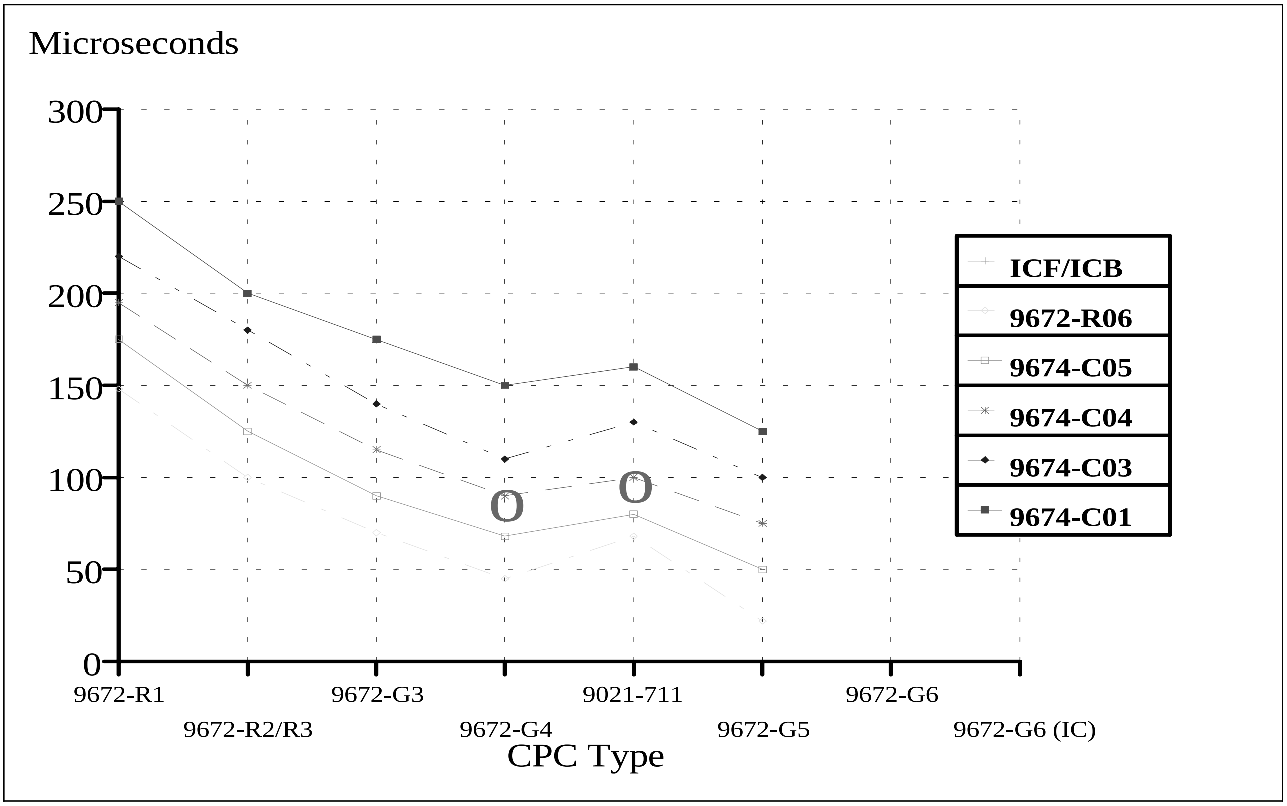

Figure 10. Typical CF Lock Service Times As Reported by RMF

The measured DMdata average CF response times are plotted on the graph as black circles. The conclusion is that the measured DMdata service times are very much in line with the IBM expectations.

Service times are not the only measure of performance in a Parallel Sysplex. A far better measurement is the actual cost of data sharing expressed as a percentage of the total sysplex resources used. The cost of data sharing is calculated in Chapter 6, "Data Sharing Cost Calculations" on page 37.

3.1.2 Asynchronous CF Service Times

During the measurements, most of the CF requests to both CF01E and CF02E were synchronous requests.

Most GBP CF requests were executed synchrouously as shown in Figure 35 on page 67 (**B3**).

Typically asynchronous CF requests show much larger variations in CF service time due to a large variance in the amount of data being transferred to and from the CF, as shown in Figure 35 on page 67 (**B4**).

Figure 35 on page 67 shows the *average* response times (9:00 to 19:00) for the fraction of the DSNGEP0_GBP4 structure request that was executed asynchronously in CF01E is:

- MVSA (9021-711) 1572 microseconds (**C**)
- MVSC (9672-G4) 800 microseconds (**D**)

The Asynchronous GBP service times are summarized in Table 11 on page 21.

Table 11. Ejby: RMF Reported Asynchronus Service Time. DB2 GBP Structures in Microseconds	
System	**Average**
MVSA	1572
MVSC	800

These numbers are within IBM expectations.

3.2 Link Utilizations

RMF reports CF link utilization for links that are HiPerLinks. The utilization is listed in the Channel Activity Postprocessor report under the heading "IS" as follows:

The *highest* HiPerLink utilizations reported on April 8, were as follows:

- Ejby:
  - 3% - Sender Path 84 (MVSC to CF01E)
  - 2% - Sender Path 85 (MVSC to CF02E)

  Based on CF request rates, as reported in Figure 4 on page 10 and Figure 5 on page 11, the corresponding utilization on the (non-HiPerLink) links to MVSA can be *estimated* to be:

  - 7% - Sender Path 70 (MVSA to CF01E)
  - 4% - Sender Path 71 (MVSA to CF02E)
- Brabrand:
  - 1% - Sender Path 05 (FCPU to CF02B)
  - 1% - Sender Path 04 (FCPU to CF01B)

  Based on CF request rates, as reported in Figure 8 on page 16 and Figure 9 on page 18, the corresponding utilization on the (non-HiPerLink) links to BCPU can be *estimated* to:

  - 5% - Sender Path 70 (BCPU to CF02B)
  - 4% - Sender Path 71 (BCPU to CF01B)

There are two subchannels per OS/390 per link. In all of these cases, two links are installed (yielding four subchannels), as shown in Figure 44 on page 74 (**E**).

RMF maintains a counter of how often a subchannel was found busy. This counter is shown in the Subchannel Section of the Coupling Facility Activity RMF report as shown in Figure 44 on page 74 (**F**). This counter is incremented if all (four) subchannels are busy. The following list illustrates the maximum reported number (busy counts) based on 10-minute intervals during April 8:

- MVSA - 100
- MVSC - 300
- BCPU - 60
- FCPU - 0

Another way of expressing this contention is to look at the percentage of CF requests that experience subchannel busy contention. Doing this calculation yields numbers that are all below 0.05%. All in all it can be concluded that there is very low CF link contention, based on the activity DMdata/Danske Data experiences today.

The numbers for these systems can be contrasted with MVSB in Ejby, which has only one link (2 subchannels). The maximum reported subchannel busy number there is in excess of 20,000, indicating that one link is probably not sufficient.

Note: For availability reasons, it is recommended that a production environment should always have more than one physical CF link between a CF and a CPC.

CF link performance is key for Parallel Sysplex performance. It is therefore always recommended to use the latest link technology where possible. Internal Cluster Bus (ICB) links, and Internal Channel (IC) links offer much greater bandwidth (3 to 12 times the bandwidth of the links DMdata/Danske Data currently have installed). This is of particular importance when faster CPCs and CFs are being used and/or when a higher degree of data sharing and workload balancing is being implemented.

3.3 CF Structures

In the following section we look primarily at the DB2 CF structures. They are the lock structure, the group buffer pool structure and the SCA structure.

3.3.1 CF Structure Placement

Rebuild of GBP structures was not supported for DB2 V4. This means that all databases that use a GBP structure have to be stopped before a GBP structure can be reallocated in a different CF. Realistically this means stopping all DB2 members in a planned outage situation. In an unplanned outage situation, an outage of the CF containing the SCA and lock structures is not visible to the applications. The SCA and lock structures have similar rebuild and recovery behavior; they can be rebuilt in seconds. However, an outage of the CF containing the GBP structures means a recovery of the data that had not yet been castout of the GBPs. For this reason, in DB2 V4, we recommend that you separate the GBP structures from the SCA and lock structures. If all the GBPs are placed in the one CF, in case of a random CF failure, there is a 50/50 chance that the GBPs will not be affected. If they are distrubuted over both CFs, then some GBPs will definitely be affected by an unplanned outage. Also, in the case of planned maintenance to a CF, DB2 will only be affected half the time.

In DB2 V5, the DB2 structures should be distributed among the CFs to balance the load, rather than to separate the SCA and lock from the GBPs. Placement for availability is not an issue with DB2 V5 for planned outages, or for unplanned outages if Duplex GBPs are being used.

As DMdata are still using DB2 V4, it is recommended for availability reasons to separate SCA and GBP structures in different CFs. GBP5, is however, *in the same CF* as the corresponding SCA in CF01B (Brabrand). The SCA in CF01E (Ejby) is placed together with all GBPs except GBP4.

Recommendation for Availability

In both Brabrand and Ejby, the GBP and SCA structures are placed in the same CF. Since availability is always a major concern, SCA and GBP structures should always be put in separate CFs until you move to DB2 V5.

If problems occur in terms of not having enough “white space,” then more CF storage should be installed. Currently this is not an issue. All CFs in both centers have enough “white space” to accommodate rebuilds of all structures from their peer CF. It may become necessary to add more storage if new structures are added or existing structures are enlarged.

You may use more than 2 GB of storage in a CF. The performance penalty for using ESTOR (expanded storage on the CF) is negligible.

Based on the observed CF loads, balancing CF structures to “even” the load between the CFs is not necessary at this point in time.

Figure 3 on page 9 illustrates the storage layout of all the CFs in Ejby. Figure 7 on page 14 illustrates the storage layout of all the CFs in Brabrand.

3.3.2 Lock Structures

Two lock structures are included in this analysis:

1. IRLM lock structure in Ejby (LOCK1 in CF01E)
2. GRS lock structure in Brabrand (ISGLOCK in Brabrand)

Each is discussed in the following sections, with respect to size, contention and false contention.

Lock structures have a hash table which is used to determine whether there is cross-system interest on a particular locked resource. If the hash table is too small, multiple locks may consequently be represented by a single hash value.

Thus, it is possible to have *false lock contention* . This occurs where two different locks hash to the same hash entry in the CF lock table in the lock structure. The second lock requester is suspended until it is determined that there is no real lock contention on the resource. False lock contention causes extra XCF messages to be generated, extra CPU resources to be consumed and prolonged response time.

Another thing that causes false lock contention in DB2 V4 is the so-called pageset p-lock contention. Unfortunately this contention cannot be decreased by increasing the size of the lock table. False contention may be a problem for DMdata/Danske Data with workloads that are write-intensive and have heavy inter-DB2 interest. The amount of false contention observed during the April 8 measurements is discussed in the following sections. To an extent, you may be able to reduce false contention by specifying a larger lock structure and then manually rebuilding it.

Note: An ALTER command will not increase the size of the hash table. A larger SIZE specification in the CFRM policy will cause a REBUILD command to enlarge the hash table.

If IRLM messages indicate that the lock structure is full, then that may be an indication that there are too many resources being modified concurrently. This may for example occur if an update job loops. In this situation, the offending job should be identified and cancelled. No structure full condition was observed during the measurements.

The space in the IRLM lock structure is divided into a lock table and so-called record lists. The record lists are used for IRLM to handle modify locks (which become retain locks in case a system or CF fails). You do not directly tell IRLM the size of the lock table; the size of the lock table portion of the lock structure depends on the lock table entry width[1] and the number of lock entries.

The number of lock table entries is not a smooth function of structure size; rather it is a step function of structure size because of the need to allocate in powers of two.

When the number of lock table entries doubles, the hash algorithm can spread the locks across twice as many entries as before. If the hash algorithm is relatively "even," on average every doubling will halve the false contention rate (and will not affect the real contention rate at all). For a lock structure, the count of LST/DIR (from RMF PP reports) entries is the count of "record data" entries that are used by IRLM to record additional data about held modify locks, to be used for recovery purposes (for example, retained lock processing). For an example of where this information is obtained from RMF, refer to Figure 37 on page 68 (**G**). Refer to *DB2 for MVS/ESA V4 Data Sharing: Planning and Administration* for more information about how to size your lock structures.

1 In DMdata/Danske Data the lock entry size is two bytes (since the IRLM MAXUSRS number is below 7).

Now we can look at the lock structure details:

3.3.2.1 IRLM Lock Structure in Ejby

The IRLM lock structure used for DB2 data sharing in the production data group in Ejby is called DSNGEP0_LOCK1. Its size is specified as 128,000 (1 KB increments).

Information about the DSNGEP0_LOCK1 is shown in Figure 32 on page 64 (**K**).

The number of lock entries is therefore 2^{25} (approximately 32 million entries), which occupies 64 MB of the lock structure. A rather large portion (the other 64 MB) is then set aside to record lists as discussed later in this section. The number of record lists in the structure is 374 K. An analysis reveals that there appears to be “enough” lock entries and record data elements. The “highwatermarks” observed during April 8, were approximately 250,000 used lock entries and approximately 10,000 record data entries. The IBM CF Monitor can reveal “highwatermarks.” For an example of how this looks for GBP structures, refer to Figure 48 on page 76 (**H**). Similar screens may be obtained for lock structures (not shown here).

Also note that, on the other hand, RMF interval reports reveal that the total contention is often around 5% during peak periods, most of which is false contention. Total contention can be calculated by dividing the -CONT field (**I**) by the REQ TOTAL (**J**), as shown in Figure 34 on page 66. (Note that this report is for the whole day, not just the peak periods.) The reason appears to be that the hashing is not “even” and is related to the way DB2 V4 uses the IRLM lock structure and its internals.

Despite the fact that the hashing is not completely “even” DMdata/Danske Data would still be able to lower the false contention by increasing the number of lock entries.

Recommendation for Performance

Install V5 of DB2 which has an improved method for using the IRLM lock structure.

Before implementing DB2 V5, DMdata/Danske Data may wish to increase the IRLM structure size to decrease false lock contention.

This would increase the number of lock entries to either 2^{26} (corresponding to a lock entry portion of the lock structure of 128 MB), or perhaps 2^{27} (corresponding to a lock entry portion of the lock structure of 256 MB). In addition, we still need to add room for the record data entries.

In the current allocation, approximately half of the structure was set aside for record entries. In the case of increased lock entries, adding 50% extra for record data entries would lead to waste of storage in the structure. A safe bet would be to double the lock structure by adding 64 MB for the record lists.

After migration to V5, the size of the structure may be lowered again if the space is needed for other structures.

Recommendation for Performance

We recommend that you monitor the amount of false contention. Sudden increases in false contention can arise depending on workload profile, leading to increased overhead. If this happens on a regular basis, the lock structure size should be increased and the amount of false contention should decrease.

IRLM issues messages (DXR142I) if it determines it is running out of space in the lock structure. It will issue messages at 75%, 90%, 95% and 100% in use. In the meantime, work proceeds in the DB2 data sharing group with the following restrictions:

- 75% full, data sharing continues with no restrictions.
- 90% full, data sharing continues, but only "must-complete-type" lock requests will be processed. *All other* requests fail.
- 95% full, the same situation as with 90% full.
- 100% full, *every* request to the structure will fail.

Should "short on storage" situations occur, you may then rebuild the structure to a larger size. Notice that retained locks should be cleared first and that a `SETXCF_START,ALTER,STRNM=strname,SIZE=newsize` command will only affect the record data portion of the structure. *Only* when the lock structure size is increased in the CFRM policy *and* the structure is rebuilt will the lock structure portion be increased.

The performance effect of false lock contention is shown in detail in 6.2, "Ejby Data Sharing Cost Calculation - Morning" on page 39, and 6.3, "Ejby Data Sharing Cost Calculation - Afternoon" on page 40.

The detailed calculation, in the DMdata/Danske Data case, reveals that false lock contention was roughly 70% to 80% of total contention. As a consequence, false contention contributes to 10% to 30% of the data sharing overhead. In other words false lock contention has an associated CPU cost of 2-6 MIPS. False lock contention also causes a slightly less responsive system, although this effect is almost negligible. For more information, refer to Chapter 6, "Data Sharing Cost Calculations" on page 37.

3.3.2.2 IRLM Lock Structure in Brabrand

This structure was not analyzed further. A similar discussion applies as to the lock structure in Ejby.

3.3.2.3 ISGLOCK Lock Structure in Brabrand

GRS uses the contention and management capability of a lock structure to determine and assign ownership of a particular global resource. Each image only maintains a local copy of its global resources. The GRS lock structure has the overall image of all global resources in use.

The GRS lock structure ISGLOCK is the CF structure with the most activity in Brabrand during the measurement interval; see Figure 46 on page 75 (**L1**, **L2**, **L3** and **L4**).

The size is specified as 131328 KB, and appears to be a reasonable size in that both total lock contention and false lock contention were rather low. The corresponding number of lock entries is approximately 16 million (2^{24}). Total lock contention was observed to be between 0.1% to 1.5%, and the corresponding false lock contention was 0% to 0.5%.

The CFMON monitor revealed a rather constant number of lock entries in use (80,000). This report is not shown.

If either the policy size or the amount of storage available in the CF is insufficient, GRS issues message ISG338W.

Total ISGLOCK lock contention is a function of ENQ activity, and false lock contention may be tuned by increasing the size of the ISGLOCK structure. If the false contention rate is high (greater than one or two percent), use a larger lock structure (double the number of lock entries) to reduce the rate. Then increase the policy size for the structure and rebuild the structure to reduce the amount of false contention. To rebuild a ISGLOCK structure, use the SETXCF START,REBUILD command.

A GRS star complex provides the following advantages:

- Reduced Response Time

  Response time is improved in a star complex because each ENQ request for a resource that is not in contention can be completed with only two CF requests to the CF, rather than having to pass the RSA message to each system in the complex.

- Reduced Processing Time

  In a GRS star complex, the CPU overhead required to process an ENQ or DEQ request is limited to the system on which the request originated, and the CF, as well as the system chosen to be the global contention manager by XES (if one is needed). Therefore, the total processor time consumed across a star complex may be less than that consumed by a GRS ring complex.

- Availability and Recovery

  Availability and recovery time are improved with a star configuration since the systems that make up the complex are not dependent on each other, as they are in the ring. The star complex does not have to alter processing to adjust topological changes due to a system joining or leaving it.

No attempt is made in this redbook to quantify these benefits. Measurements done outside this project confirm that the CPU savings for the GRS function can be significant (up to 15%). There are great variations between systems depending of the distribution of global ENQ requests among the systems.

3.3.3 GBP Structures

The size of the GBP is one of the most critical factors in determining the performance of a data sharing group. Too small or a "wrongly" apportioned GBP structure has no impact on availability, but may have great impact on performance.

A GBP consists of two parts:

- Data Pages

  When a program running on a member DB2 subsystem changes a page in a data set that is open on other member DB2 subsystems, the changed data page is written to a GBP data entry as part of commit processing. Changed data written to the GBP is later written to DASD via a process called castout.

  The size of a data page is either 4 KB (as in the GBP structures listed in Table 12 on page 27) or 32 KB, depending on the page size supported by the corresponding bufferpools. (In DB2 V6, you also have the option of a 8 KB or 16KB page size).

- Directory Entries

  When a DB2 member reads a page into its local bufferpool from a data set that is being updated by another DB2 member, it registers the page in the directory entry. This registration ensures that the DB2 member is notified if another member updates the page.

  The approximate size of a directory entry is 200 bytes. The actual size depends on CF level, and whether 4 KB or 32 KB are used in the bufferpool.

The space allocated in the GBP is divided into directory entries and data pages according to the so-called directory entry-to-data element ratio (or just entry-to-element ratio). When you originally define the structure in the CFRM policy for a GBP, you specify its total size. You can change the default DB2 entry-to-element ratio (5:1) with the DB2 command ALTER GROUPBUFFERPOOL.

If the number of directory entries is larger than the number of virtual and hiperpool buffers, plus the number of GBP pages that are likely to be different than the corresponding local bufferpool pages, directory entry reclaims should not occur.

We concentrate on the GBP structures in Ejby. Each is listed in Table 12 with associated important information.

Table 12. Ejby: Group Buffer Pool Detailed Information by Structure

Name	**Size MB**	**Average Request Rate**	**Directory Entries**	**Directory Entries Max**	**Data Elements**	**Data Elements Max**	**Entry to Element Ratio**	**Directory Reclaims (Max)**
GBP0	63	3	63 K	44 K	13 K	11 K	6:1	0
GBP1	500	369	232 K	165 K	116 K	116 K	2:1	0
GBP2	63	155	73 K	33 K	12 K	12 K	6:1	0
GBP3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP4	313	330	**319 K**	**319 K**	64 K	64 K	5:1	**43/s**
GBP5	125	475	83 K	55 K	28 K	28 K	3:1	0

Table 12 indicates that all GBPs, except GBP4, which is highlighted in the table, have an adequate number of directory entries defined. The number of directory entries in GBP4 was exhausted since the number of directory entries maxed out. The directory reclaims caused by lack of directory entries cause cross-invalidations and extra I/O and are never recommended.

In fact, issuing a DB2 command -DISPLAY GROUPBUFFERPOOL (GBP4) GDETAIL(*) revealed that during the last ten days leading up to April 8, approximately 4.5 million cross-invalidations took place due to directory reclaims. Contrast this with 1.5 million cross-invalidates due to “normal” write activity. Sample output of the DB2 command is provided in B.3, “Display DB2 Commands” on page 78; refer to Figure 50 on page 78 (M).

Recommendation for Performance

Directory reclaims should be avoided whenever possible. The remedy is either to alter (increase) the entry-to-element ratio, enlarge the total GBP structure size, or a combination of both.

3.3.4 SCA Structures

The DB2 SCA structure is a function of the number of databases, tables, and exception conditions.

Running out of space in this structure will cause DB2 to crash. Much of the space is reclaimed by correcting the database exception condition. Use of the DB2 command DISPLAY GROUP will show the size of the SCA structure (64 MB in this case) and how much of it is in use.

Be aware that the usage may vary substantially, such as when a CF is lost, causing a large temporary number of exception conditions.

Care should be taken when interpreting the results. A low percentage used may only indicate that there are few exception conditions at that time, not that the SCA is over-allocated.

64 MB as defined in the case of DMdata/Danske Data should be sufficient even for a very large DB2 installation.

Chapter 4. XCF Observations

Refer to the following Web site for a valuable discussion about XCF performance considerations in "Parallel Sysplex Performance XCF Performance Considerations" (WSC Flash 9723):
`http://www.ibm.com/support/techdocs/wscflash.nsf`

What follows is not a detailed analysis, but mostly some observations derived from the discussion in the WSC Flash, that are related to the Ejby case study. Using these considerations, we analyze Ejby for XCF related constraints, such as:

- Message class size
- Buffer shortage (inbound as well as outbound)
- Insufficient number of signalling paths
- RMF Monitor III view

The largest user of XCF signalling, GRS, was converted to GRS Star mode after the measurements were taken. A rather large portion of the XCF signalling has thus been eliminated in Ejby.

4.1 XCF Setup

In 4.1.1, "CLASSDEF/CLASSLEN" we look at XCF message class definitions and examine how XCF buffer storage is used.

4.1.1 CLASSDEF/CLASSLEN

DMdata/Danske Data has defined two message classes DEFSMALL and DEFAULT, with a corresponding (size) CLASSLEN of 956 and 16316 bytes respectively. Both classes are assigned messages based on size (GROUP(UNDESIG)). These definitions are in accordance with the normal IBM recommendations.

The message bufferpool is limited by the MAXMSG(500) parameter to approximately 8 MB per system. The formula to calculate the total XCF bufferpool space is as follows:

```
XCF space = MAXMSG * (no. classes * no. systems + no. pathouts + no. pathins).
```

The default value in OS/390 R3 is 750 K bytes for the MAXMSG value. This value is coded in the COUPLExx parmlib member. The recommendation is to code an asterisk (*) in which case the system will use the release-dependent default value.

4.2 XCF Request Usage

Figure 11 on page 30 provides a view of the primary XCF exploiters sorted by XCF request rate in Ejby. This picture only shows the XCF request rate averaged over the whole day, however there is very little variation over the day.

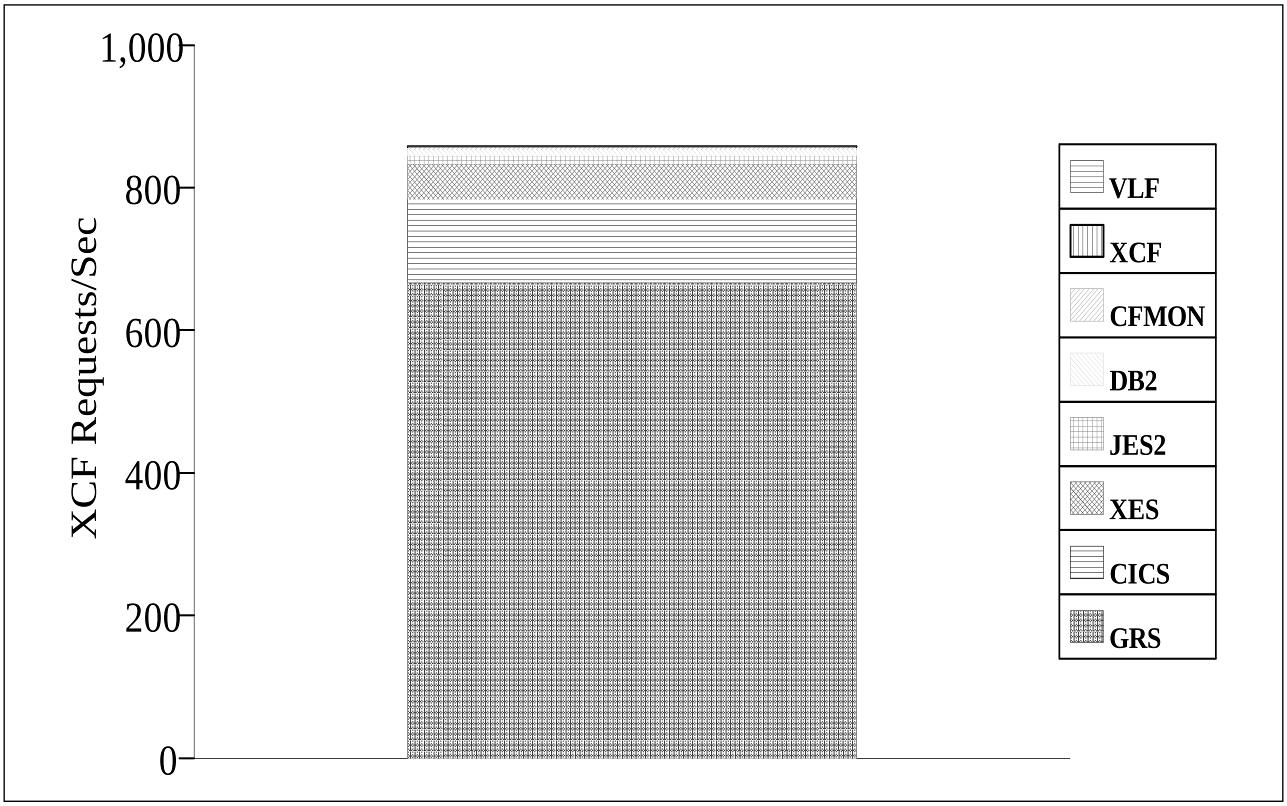

Figure 11. Average XCF Message Rates. (Ejby)

It can be seen that at the time of the measurement, GRS was generating over 600 XCF requests per second. As XCF is using CTCs, this activity did not have any impact on the CFs. Moving GRS to a star configuration should remove a large amount of the load from XCF, but it will increase the load on the CFs somewhat (given that the current request rate is a total of about 2000 requests a second over both CFs).

4.3 XCF Message Class Size Analysis

The key RMF field to monitor is the %OVR field in the XCF Activity RMF report. An example is shown in Figure 12 on page 46 (**N**). This field denotes how great a percentage of the big messages incurred overhead due to XCF buffer expansion.

Both this field and the corresponding %BIG field did not reveal any significant message expansion overhead. An example of this field is shown in Figure 12 on page 46 (**O**).

4.4 XCF Message Buffer Pool Analysis

The message buffer space is storage used by XCF to store the message buffers which are being processed, sent or received. XCF only uses the amount of storage it needs, but an upper limit is enforced at 8 MB in the case of DMdata/Danske Data.

Lack of buffer space conditions are reported in RMF reports as REQ REJECT for both OUTBOUND and INBOUND requests. Lack of buffer space is also reported in the field BUFFERS UNAVAIL. An example is shown in Figure 21 on page 54 (**Q**). In all but three 10-minute intervals, the REQ REJECT rate was zero. Refer to Figure 12 on page 46 (**P**). In three intervals, the system experienced buffer shortage. In the worst case, less than one percent of the requests experienced buffer shortage. It can be concluded that DMdata XCF performance is good and that no further tuning is necessary.

Recommendation for Performance

To avoid any future occurences of XCF buffer shortages, the MAXMSG parameter in the COUPLExx parmlib member may be increased somewhat by using asterisk (*) for MAXMSG. This will provide the default value in OS/390 R3 of 750 KB, compared to the specified value in DMdata/Danske Data of 500 KB.

4.5 XCF Signalling Path Analysis

No serious contention was found since the average queue length as reported by RMF (AVG Q LNGTH) was low. The general recommendation is to have a queue length smaller than 1. In the RMF reports, it fluctuated between 0.01 and 0.06. Refer to Figure 21 on page 54 (**R**).

RMF reports such as Figure 22 on page 55 reveal that the field ALL PATHS UNAVAIL contains non-zero values. Refer to Figure 12 on page 46 (**S**).

Recommendation for Performance

It is important that all transport classes are assigned to certain signalling paths. Make certain all PATHOUT statements are associated with corresponding CLASSDEFs. This should avoid occurrences of the ALL PATHS UNAVAIL situation.

4.6 RMF Monitor III - XCF Delays

RMF Monitor III reveals quite a lot of XCF delays. For example, RMF shows GRS as being delayed by XCF signalling.

Note: This is not always an indication of a problem. XCF signalling over CTCs uses a suspend/resume-like protocol and therefore always appears busy to RMF.

Chapter 5. Couple Data Set and GRS Observations

This section contains information related to your use of Couple Data Sets and GRS, and how they are set up.

5.1 Couple Data Sets: DDBPLEXE

The COUPLEXX PARMLIB member used at IPL was: COUPLEA0. Appendix C, "Couple Data Set Details" on page 79 shows the list of couple data sets.

In the following, only the Ejby setup is examined.

5.1.1 CDS Placement

In Ejby the CDS configuration is as follows:

Table 13. Ejby: CDS Configuration

CDS Name	Primary	Alternate	VOLSER
Sysplex (XCF)	√		MVSX10
		√	MVSX11
ARM		√	MVSX10
	√		MVSX11
CFRM		√	MVSX10
	√		MVSX11
SFM		√	MVSX10
	√		MVSX11
LOGR		√	MVSX10
	√		MVSX11

Sysplex CDS are shared by all systems in the Parallel Sysplex. The other CDSes (often referred to as function couple data sets) must be shared by those systems using that function.

Recommendation for Availability

The configuration listed in Table 13 on page 33 is in accordance with the IBM recommendations, which under normal circumstances states that the primary sysplex couple data set (SYS1.XCF01) should not be on the same volume as the primary CFRM couple data set (SYS1.DDBPLEXE.PLEXP01). All other primary couple data sets can reside on the same volume, and all other alternate couple data sets can reside on a different volume.

Always observe the following:

- To avoid a single point of failure in the sysplex, all couple data sets should have an alternate couple data set on a different device, control unit, and channel from the primary.
- When the alternate couple data set replaces the primary, the original primary data set is deallocated and there is *no longer* an alternate couple data set. Since it is recommended to have an alternate couple data set *always* available to be switched, consider formatting three data sets before IPL. For example:
  - SYS1.XCF01 - (primary CDS)
  - SYS1.XCF02 - (alternate CDS)
  - SYS1.XCF03 - (spare)

  Then, if the alternate (SYS1.XCF02) becomes the primary, you can issue the SETXCF COUPLE,ACOUPLE command to make the spare data set (SYS1.XCF03) the alternate.
- Although not mandatory, it may be advantageous to put the CFRM (or sysplex) pair on two completely different volumes to ensure that the CFRM primary and sysplex primary CDS never will reside on the same volume (if MVSX10 should fail, for instance).
- Always have DFW, or a similar function enabled for the CDS volumes to ensure optimal performance. The CDSes are not normally very active, but may be extremely busy during recovery, startup and so on.
- Always place couple data sets on volumes that are *not subject* to reserve/release contention or significant I/O contention from sources not related to couple data sets. This is true even if the I/O contention is sporadic.

The two volumes (MVSX10 and MVSX11) were examined to determine how they were performing. The results are summarized in Table 14.

Table 14. Ejby: CDS Volume Performance

VOLSER	Typical I/O Rate	Typical I/O Response Time
MVSX10	4-10/s	4-5 ms
MVSX11	4-5/s	70-120 ms

DMdata/Danske Data is running OS/390 R3 and therefore RMF DASD performance data was not available on a per data set level. Since MVSX11 had very long response times, a closer investigation revealed the cause to be the CF Monitor, which scans the CFRM couple data set on a regular basis.[2].

Recommendation for Performance

Although the effect described has not been thoroughly investigated, we recommend that you *turn this version of the CF Monitor off* during normal processing.

We further recommend you *lower the cycle time* of the monitor to between 60 and 600 seconds, and to have not more than *one CF Monitor master active* (the other monitors should be started as slaves).

Later versions of the CF Monitor do not have the problem described. For more information about the CF Monitor, refer to *Parallel Sysplex CF Online Monitor: Installation and User's Guide*, SG24-5153.

5.2 Sysplex ENQ Delays

It is beyond the scope of this redbook to find out whether the following ENQ delays warrant further investigation. DMdata/Danske Data will be able to assess the delays, weighing in such factors as importance of jobs, extension of delays and so on.

ENQ delays are caused by contention for shared resources among different systems in the sysplex and you may not be able to avoid them in all situations.

Table 15 shows a listing of the largest delays caused by ENQ contention during April 8. This information was obtained by using RMF Monitor III to look at 10-minute intervals across the day. No attempt has been made to evaluate the impact of the delays.

Table 15. Ejby: Sysplex ENQ Samples

Major Name	Minor Name	Time	Percent Delay	Job(s) Affected	On System
SYSIEWLP	ADKDCS.CICSLIB	10:00	13%	DKIRLG14	MVSB
			13%	DKIRLG10	MVSA
			13%	DKIRL740	MVSC
SYSIEWLP (1)	G39.CS.CICSLIB	10:50	21%	DKSRL900	MVSA
			21%	DKSRL110	MVSB
			20%	DKSCSPSS	MVSC
SYSDSN (2)	E10952.UNRELOAD.I9079119.S	12:00	15%	E10952UL	MVSA
			13%	E10952UL (?)	MVSA
SYSDSN	AOCP.OPPC.ENQUEUE	12:00	90+%	OCD**	MVSB
		12:00	86%	OCB**	MVSB
		12:00	85%	OCDADDPI	MVSB
SYSDSN (3)	HPSR52Q.USER1.HPS001DI.VI	13:10	99%	HPJVSAM1	

Note:
(1) Systemtest?
(2) TSO user on production system?
(3) HPS migration?

2 The CF Monitor has since been changed to perform this task less frequently

Chapter 6. Data Sharing Cost Calculations

Using the methodology described in 6.1, "Data Sharing Overhead Methodology with Example Case Study," a Lotus 1-2-3 spreadsheet was created to calculate the cost of data sharing in both Ejby and Brabrand. The calculations are organized as follows:

- 6.2, "Ejby Data Sharing Cost Calculation - Morning" on page 39
- 6.3, "Ejby Data Sharing Cost Calculation - Afternoon" on page 40
- 6.4, "Brabrand Data Sharing Cost Calculation - Morning" on page 41
- 6.5, "Brabrand Data Sharing Cost Calculation - Afternoon" on page 42

6.1 Data Sharing Overhead Methodology with Example Case Study

The following methodology and its description is provided by Gary M. King in the IBM S/390 Poughkeepsie Division. It was published on July 22, 1997.

6.1.1 Data Sharing Overhead Methodology

Most of the cost of data sharing may be accounted for in three components:

1. Global locking (use of a CF lock structure to prevent transactions running on different images from updating the same record),
2. Global lock contention (use of XCF messaging among local lock managers to resolve the case when transactions on different images want to update the same record at the same time),
3. Local buffer coherency (use of a CF cache structure to insure updated records are reflected in all images' local buffer pools).

It is quite straightforward to estimate these costs for a system that is currently data sharing. The RMF Coupling Facility Activity report gives the frequency and hardware cost for global locking (lock structure activity), local buffer coherency (cache structure activity) and the frequency of global lock contention (lock structure activity). A software cost (path length within the lock managers, buffer managers and MVS services) for each function has been determined through laboratory measurements. Thus, the cost of data sharing can be estimated by multiplying the frequency of each operation times the software+hardware cost, and summing for all operations.

This methodology has been validated through laboratory measurements conducted at IBM Poughkeepsie. The results of these tests are documented in *S/390 Parallel Sysplex Performance*, SG24-4356. Basically, before- and after-data-sharing measurements were collected and overhead calculated. This overhead was then estimated by the methodology described above. The estimated overheads were found to match very closely with the measurements. An additional validation was conducted at a customer site using a production system that has been exclusively dedicated to a particular application for a number of years. Here the total CPU cost per transaction (based on total processor busy and transaction rate) was compared for months before migrating to data sharing and months after. Again, the estimated and measured overheads matched very closely.

Why use this methodology instead of simply comparing CPU time per transaction before and after a data sharing migration? The reason is that for a meaningful CPU time comparison, one requires a production system dedicated to an application and a consistent workload before and after the migration - a very rare situation. The dedicated-requirement is due to the need to account for the total impact to the capacity of a system - looking at just the change in DB2 time per transaction, for example, is interesting but may be misleading since DB2 generally only accounts for 25%-35% of the total CPU time of major "DB2" workloads. The consistent- requirement is due to not wanting the comparison to be influenced by a changing transaction load or mix. The methodology based on CF activity can be applied to the “after” case without concern for whether the application is the only one running, or whether the workload changed from the “before” case. Of course, as the workload continues to change after the data sharing migration (or more applications are migrated to data sharing), the calculations may be repeated to keep the overhead estimation current.

6.2 Ejby Data Sharing Cost Calculation - Morning

```
Datasharing Cost Calculation: Danske Data - Ejby Central
Done 15/7 1998
Based on RMF: 08/4 1998  11:00-11:10                   10 minutes        600 seconds


System description:

          2  CFs (2-way C04s):      7.9       6.2 % Average CPU Busy

          Systemname:         CPU                        Single Engine Capaci     Busy%  Used Sys Capacity   Total Sys Capacity

          MVSA      OS/390 R3 9021-9X2  (10-WAY LPAR)                   48.2      79.2     381.7                482 MIPS
          MVSC      OS/390 R3 9672-R55  (5-WAY LPAR)                    52.4      75.4     197.5                262 MIPS

                              R94 (Base for calculation of the SW cost)    35.4 MIPS
                              Synch to Asynch Elongation Factor:  1.4

          Scenario 1 DB2                       MVSA

          Structure:          Frequency Percent   Software  Software  Hardware   Total
                              per sec   Synchron  mics R94  mics      mics (RMF) CPU seconds

            SCA                     0.3       100        68        50       207    0.0001          REQ TOTAL:             295000
            LOCK1                   396       100        68        50   A1  101    0.0598          Total Cont (-CONT):      9099
            GBP0                    1.7      67.8       117        86       126    0.0004          False (-FALSE CONT):     6117
            GBP1                  136.4      97.2       117        86       156    0.0334
            GBP2                  146.7      95.8       117        86       107    0.0288
            GBP32K1                   1      10.3       117        86       113    0.0003          Total Contention %        3.1
            GBP4                  196.1      97.2       117        86       140    0.0448          False Contention %:       2.1
            GBP5                  329.5        82       117        86       138    0.0791          Real Contention %:        1.0
            GBP7                    0.1        93       117        86       104    0.0000
          Lock contention:         15.2                2114      1553         0    0.0235
          Total Requests         1207.8           N/A       N/A       N/A          0.2701
          Total Data Sharing Cost                      13.0 MIPS      corresponding to:        3.4 % of total used system capacity


          Scenario 2 DB2                       MVSC

          Structure:          Frequency Percent   Software  Software  Hardware   Total
                              per sec   Synchron  mics R94  mics      mics (RMF) CPU seconds

            SCA                     0.3       100        68        50       203    0.0001          REQ TOTAL:             484000
            LOCK1                   206       100        68        50   B1   93    0.0294          Total Cont (-CONT):     21000
            GBP0                    0.4        84       117        86       125    0.0001          False (-FALSE CONT):    16000
            GBP1                   20.6      96.9       117        86       137    0.0046
            GBP2                    9.2      96.6       117        86       115    0.0019
            GBP32K1                 0.2         0       117        86       120    0.0001          Total Contention %        4.3
            GBP4                  163.1      94.6       117        86       133    0.0365          False Contention %:       3.3
            GBP5                  209.7        92       117        86       127    0.0461          Real Contention %:        1.0
            GBP7                      0         0       117        86         0    0.0000
          Lock contention:         35.0                2114      1428         0    0.0500
          Total Requests          609.5       N/A       N/A       N/A              0.1687
          Total Data Sharing Cost                       8.8 MIPS      corresponding to:        4.5 % of total used system capacity




          Total Data Sharing Cost: MVSA                13.0 MIPS      corresponding to:        3.4 % of total used system capacity

          Total Data Sharing Cost: MVSC                 8.8 MIPS      corresponding to:        4.5 % of total used system capacity

          Grand Total Data Sharing Cost                21.9 MIPS      corresponding to:        3.8 % of total used system capacity

Disclaimer This spreadsheet has not been formally evaluated.   The methoology is based on a paper by Gary King:
           Data Sharing Overhead Methodology with example case study" Juy 22. 1997.   Kindly provide your feedback to
           Henrik Thorsen (Henrik_Thorsen@dk.ibm.com).



           Color Legend:

                    User Input primarily from RMF
                    Poughkeepsie Benchmark Data to calculate SW-cost
                    Calculations - do not overtype|
```

For more information on **A1**, refer to page 19
For more information on **B1**, refer to page 19

6.3 Ejby Data Sharing Cost Calculation - Afternoon

Datasharing Cost Calculation: Danske Data - Ejby Central
Done 15/7 1998
Based on RMF: 08/4 1998 14:00-14:10 10 minutes 600 seconds

System description:

2 CFs (2-way C04s): 6.6 4.9 % Average CPU Busy

Systemname:	CPU	Single Engine Capaci	Busy%	Used Sys Capacity	Total Sys Capacity
MVSA	OS/390 R3 9021-9X2 (10-WAY LPAR)	48.2	67.4	324.9	482 MIPS
MVSC	OS/390 R3 9672-R55 (5-WAY LPAR)	52.4	74.3	194.7	262 MIPS

R94 (Base for calculation of the SW cost) 35.4 MIPS
Synch to Asynch Elongation Factor: 1.4

Scenario 1 DB2 MVSA

Structure:	Frequency per sec	Percent Synchron	Software mics R94	Software mics	Hardware mics (RMF)	Total CPU seconds
SCA	0.3	100	68	50	209	0.0001
LOCK1	292.4	100	68	50	A2 102	0.0444
GBP0	1.9	72.2	117	86	115	0.0004
GBP1	144.5	96.9	117	86	156	0.0354
GBP2	136.8	96.9	117	86	107	0.0267
GBP32K1	0.5	18.8	117	86	110	0.0001
GBP4	139	96.8	117	86	140	0.0318
GBP5	277.2	73	117	86	134	0.0675
GBP7	0.1	93.5	117	86	104	0.0000
Lock contention:	11.1		2114	1553	0	0.0172
Total Requests	992.7		N/A	N/A	N/A	0.2238

REQ TOTAL:	228000
Total Cont (-CONT):	6652
False (-FALSE CONT):	5061
Total Contention %	2.9
False Contention %:	2.2
Real Contention %:	0.7

Total Data Sharing Cost 10.8 MIPS corresponding to: 3.3 % of total used system capacity

Scenario 2 DB2 MVSC

Structure:	Frequency per sec	Percent Synchron	Software mics R94	Software mics	Hardware mics (RMF)	Total CPU seconds
SCA	0.3	100	68	50	196	0.0001
LOCK1	449.2	100	68	50	B2 99	0.0669
GBP0	0.6	90.6	117	86	131	0.0001
GBP1	14.4	96.7	117	86	137	0.0033
GBP2	7.9	98.2	117	86	112	0.0016
GBP32K1	0.1	0	117	86	110	0.0000
GBP4	129.3	94.1	117	86	128	0.0283
GBP5	178.8	89.2	117	86	119	0.0382
GBP7	0	0	117	86	0	0.0000
Lock contention:	25.0		2114	1428	0	0.0357
Total Requests	780.6	N/A	N/A	N/A		0.1742

REQ TOTAL:	377000
Total Cont (-CONT):	15000
False (-FALSE CONT):	12000
Total Contention %	4.0
False Contention %:	3.2
Real Contention %:	0.8

Total Data Sharing Cost 9.1 MIPS corresponding to: 4.7 % of total used system capacity

Total Data Sharing Cost: MVSA	10.8 MIPS	corresponding to:	3.3 % of total used system capacity
Total Data Sharing Cost: MVSC	9.1 MIPS	corresponding to:	4.7 % of total used system capacity
Grand Total Data Sharing Cost	19.9 MIPS	corresponding to:	3.8 % of total used system capacity

Disclaimer This spreadsheet has not been formally evaluated. The methoology is based on a paper by Gary King: Data Sharing Overhead Methodology with example case study" Juy 22. 1997. Kindly provide your feedback to Henrik Thorsen (Henrik_Thorsen@dk.ibm.com).

Color Legend:

User Input primarily from RMF
Poughkeepsie Benchmark Data to calculate SW-cost
Calculations - do not overtype

For more information on A2 , refer to page 19
For more information on B2 , refer to page 19

6.4 Brabrand Data Sharing Cost Calculation - Morning

```
Datasharing Cost Calculation: Danske Data - Brabrand Central
Done 15/7 1998
Based on RMF: 08/4 1998  11:00-11:10                    10 minutes        600 seconds


System description:

          2  CFs (2-way C04s):      1.5       2.2 % Average CPU Busy

          Systemname:         CPU                        Single Engine Capaci     Busy%  Used Sys Capacity   Total Sys Capacity

          BCPU      OS/390 R3 9021-9X2  (10-WAY LPAR)                 48.2      82.6     398.1                482 MIPS
          FCPU      OS/390 R3 9672-R45  (4-WAY LPAR)                  51.5      40.5      83.4                206 MIPS

                              R94 (Base for calculation of the SW cost)    35.4 MIPS
                              Synch to Asynch Elongation Factor:  1.4

          Scenario 1 DB2                        BCPU

          Structure:          Frequency Percent   Software  Software  Hardware   Total
                              per sec   Synchron  mics R94  mics      mics (RMF) CPU seconds

            SCA                     0.3       100        68        50       213    0.0001          REQ TOTAL:            164000
            LOCK1                   182       100        68        50       111    0.0293          Total Cont (-CONT):      1269
            GBP0                    0.3      90.3       117        86       187    0.0001          False (-FALSE CONT):     1054
            GBP1                  111.6      97.6       117        86       159    0.0276
            GBP2                   79.7      98.5       117        86       115    0.0161
            GBP4                   33.6      95.9       117        86       150    0.0081          Total Contention %        0.8
            GBP5                  110.8      89.9       117        86       149    0.0271          False Contention %:       0.7
            GBP7                    0.1      93.5       117        86       114    0.0000          Real Contention %:        0.1
          Lock contention:          2.1                2114      1553         0    0.0033
          Total Requests          518.4           N/A       N/A       N/A          0.1116
          Total Data Sharing Cost                       5.4 MIPS      corresponding to:        1.4 % of total used system capacity



          Scenario 2 DB2                        FCPU

          Structure:          Frequency Percent   Software  Software  Hardware   Total
                              per sec   Synchron  mics R94  mics      mics (RMF) CPU seconds

            SCA                     0.3       100        68        50       197    0.0001          REQ TOTAL:             26000
            LOCK1                    31       100        68        50        87    0.0042          Total Cont (-CONT):      2852
            GBP0                    0.1      77.1       117        86       102    0.0000          False (-FALSE CONT):     2803
            GBP1                    8.2      94.2       117        86       133    0.0018
            GBP2                    1.6        95       117        86       113    0.0003
            GBP4                    5.9      96.6       117        86       153    0.0014          Total Contention %       11.0
            GBP5                      9      85.3       117        86       128    0.0020          False Contention %:      10.8
            GBP7                      0         0       117        86         0    0.0000          Real Contention %:        0.2
          Lock contention:          4.8                2114      1453         0    0.0069
          Total Requests           56.1       N/A       N/A       N/A              0.0169
          Total Data Sharing Cost                       0.9 MIPS      corresponding to:        1.0 % of total used system capacity




          Total Data Sharing Cost: BCPU                 5.4 MIPS      corresponding to:        1.4 % of total used system capacity

          Total Data Sharing Cost: FCPU                 0.9 MIPS      corresponding to:        1.0 % of total used system capacity

          Grand Total Data Sharing Cost                 6.2 MIPS      corresponding to:        1.3 % of total used system capacity

Disclaimer This spreadsheet has not been formally evaluated.   The methoology is based on a paper by Gary King:
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           Henrik Thorsen (Henrik_Thorsen@dk.ibm.com).



           Color Legend:

                    User Input primarily from RMF
                    Poughkeepsie Benchmark Data to calculate SW-cost
                    Calculations - do not overtype
```

6.5 Brabrand Data Sharing Cost Calculation - Afternoon

Datasharing Cost Calculation: Danske Data - Brabrand Central
Done 15/7 1998
Based on RMF: 08/4 1998 14:00-14:10 10 minutes 600 seconds

System description:

2 CFs (2-way C04s): 1.4 2.8 % Average CPU Busy

Systemname:	CPU	Single Engine Capaci	Busy%	Used Sys Capacity	Total Sys Capacity
BCPU	OS/390 R3 9021-9X2 (10-WAY LPAR)	48.2	66.3	319.6	482 MIPS
FCPU	OS/390 R3 9672-R45 (4-WAY LPAR)	51.5	36.7	75.6	206 MIPS

R94 (Base for calculation of the SW cost) 35.4 MIPS
Synch to Asynch Elongation Factor: 1.4

Scenario 1 DB2 BCPU

Structure:	Frequency per sec	Percent Synchron	Software mics R94	Software mics	Hardware mics (RMF)	Total CPU seconds		
SCA	0.3	100	68	50	200	0.0001	REQ TOTAL:	159000
LOCK1	173.3	100	68	50	110	0.0277	Total Cont (-CONT):	1278
GBP0	7	96.9	117	86	105	0.0014	False (-FALSE CONT):	1070
GBP1	142.3	96.8	117	86	164	0.0360		
GBP2	79.7	98.1	117	86	113	0.0160		
GBP4	38	94.5	117	86	155	0.0094	Total Contention %	0.8
GBP5	99.8	89.7	117	86	148	0.0243	False Contention %:	0.7
GBP7	5.8	92.6	117	86	124	0.0013	Real Contention %:	0.1
Lock contention:	2.1		2114	1553	0	0.0033		
Total Requests	546.2	N/A	N/A	N/A		0.1194		

Total Data Sharing Cost 5.8 MIPS corresponding to: 1.8 % of total used system capacity

Scenario 2 DB2 FCPU

Structure:	Frequency per sec	Percent Synchron	Software mics R94	Software mics	Hardware mics (RMF)	Total CPU seconds		
SCA	0.3	100	68	50	200	0.0001	REQ TOTAL:	19000
LOCK1	21.3	100	68	50	90	0.0030	Total Cont (-CONT):	2977
GBP0	0.2	79.2	117	86	111	0.0000	False (-FALSE CONT):	2821
GBP1	6.6	93.2	117	86	131	0.0015		
GBP2	1.1	92.9	117	86	117	0.0002		
GBP4	6.4	93.7	117	86	104	0.0012	Total Contention %	15.7
GBP5	5.8	92.6	117	86	124	0.0013	False Contention %:	14.8
GBP7	0	0	117	86	0	0.0000	Real Contention %:	0.8
Lock contention:	5.0		2114	1453	0	0.0072		
Total Requests	41.7	N/A	N/A	N/A		0.0145		

Total Data Sharing Cost 0.7 MIPS corresponding to: 1.0 % of total used system capacity

Total Data Sharing Cost: BCPU	5.8 MIPS	corresponding to:	1.8 % of total used system capacity
Total Data Sharing Cost: FCPU	0.7 MIPS	corresponding to:	1.0 % of total used system capacity
Grand Total Data Sharing Cost	6.5 MIPS	corresponding to:	1.6 % of total used system capacity

Disclaimer This spreadsheet has not been formally evaluated. The methoology is based on a paper by Gary King:
Data Sharing Overhead Methodology with example case study" Juy 22. 1997. Kindly provide your feedback to
Henrik Thorsen (Henrik_Thorsen@dk.ibm.com).

Color Legend:

User Input primarily from RMF
Poughkeepsie Benchmark Data to calculate SW-cost
Calculations - do not overtype

Appendix A. Input Data Summary

Table 16. Input Data Summary	
Description	**MVS DS Name**
RMF Monitor III data from Ejby. (MVSA: Time: April 8, 00:06-15:16) (MVSB: Time: April 8, 08:09-15:18) (MVSC: Time: April 8, 05:51-15:21)	CCHTJ.DDB.MIII.MVS**
CF Monitor Input Based on Screenshots from Brabrand (time: April 8, 9:45-15:00).	CFMON.List.BRAB
CF Monitor Input Based on Screenshots from Ejby Sample screens and reports are provided in B.2, "Sample CF Monitor Screens" on page 75 (time: April 8, 9:45-16:00).	CFMON.List.EJBY (SEQ)
Assorted RMF Postprocessor Reports from Ejby (time: April 8, 7:50-15:50).	THORSEN.RMFEJBY (SEQ)
Assorted RMF Postprocessor Reports from Brabrand (time: April 8, 7:50-15:50).	THORSEN.RMFBRAB (SEQ)
Assorted MVS Log information, primarily DB2-related Display Group and Database commands and their associated output. DSNZPARM PARMLIB printout (time: April 8).	DBPA.CNTL (PDS)
Ejby DB2 Performance Monitor (V5) Statistics Report - Long (time: April 7 21:07 to April 9, 00:01).	DB2P.KL1356 (SEQ)
Brabrand and Ejby DB2 Performance Monitor (V5) Statistics Report - Long (Brabrand time: April 7, 21:07 to April 9, 00:01) (Ejby Time: April 8, 9:34 to 10:34).	DB2PM.CNTL (SEQ)
Assorted MVS Log information, primarily Display commands and their associated output. ICS, IPS, OPS and RNL PARMLIBS (time: April 8).	THORSEN (PDS)

Appendix B. Sample RMF, CFMON, and DB2PM Reports

This appendix contains some of the sample reports on which this redbook is based:

The sample reports include:

- RMF Postprocessor reports
  - RMF XCF Activity reports
  - RMF CF Activity reports
- CF Monitor screen captures
- Display DB2 commands
- DB2PM reports

Note that report output generally has been tailored to primarily show activity based on production CF structures. This means that CF structures that were active during the period are not depicted in detail.

B.1 Sample RMF Postprocessor Reports

The following sample shows RMF CF Activity and RMF XCF Activity reports.

RMF fields of interest are annotated (such as **A**). They are discussed in some detail in the various chapters.

B.1.1 RMF XCF Activity Reports

```
                                                  X C F   A C T I V I T Y
                                                                                                                        PAGE    1
           OS/390                  SYSTEM ID MVSA             DATE 04/08/1998            INTERVAL 10.00.000
           REL. 01.03.00           RPT VERSION 1.3.0          TIME 09.00.00              CYCLE 1.000 SECONDS


                                                   XCF USAGE BY SYSTEM
 -------------------------------------------------------------------------------------------------------------------------------

                                         REMOTE SYSTEMS                                                             LOCAL
 ---------------------------------------------------------------------------------------------------------     -----------------

                           OUTBOUND FROM MVSA                                      INBOUND TO MVSA                  MVSA
 ---------------------------------------------------------------------------   ---------------------------     -----------------
                                                   O    N         S
                                        ----- BUFFER -----       ALL                                    P
 TO        TRANSPORT  BUFFER        REQ     %    %    %    %    PATHS     REQ   FROM           REQ      REQ     TRANSPORT     REQ
 SYSTEM    CLASS      LENGTH        OUT   SML  FIT  BIG  OVR  UNAVAIL  REJECT   SYSTEM          IN   REJECT     CLASS      REJECT

 MVSB      DEFAULT    16,316         68   100    0    0    0        0       0   MVSB        98,260        0     DEFAULT         0
           DEFSMALL      956     99,002     0  100    0    0   99,002       0                                  DEFSMALL        0
 MVSC      DEFAULT    16,316      2,693   100    0   <1  100        0       0   MVSC       149,878        0
           DEFSMALL      956    147,810     0  100    0    0  147,810       0
                              ----------                                                ----------
 TOTAL                          249,573                                         TOTAL      248,138
```

Figure 12. RMF XCF Activity Report - XCF Usage by System - MVSA

For more information on **N**, refer to page 30
For more information on **O**, refer to page 30
For more information on **P**, refer to page 30
For more information on **S**, refer to page 31

X C F   A C T I V I T Y

PAGE 2

OS/390	SYSTEM ID MVSA	DATE 04/08/1998	INTERVAL 10.00.000
REL. 01.03.00	RPT VERSION 1.3.0	TIME 09.00.00	CYCLE 1.000 SECONDS

XCF USAGE BY MEMBER

MEMBERS COMMUNICATING WITH MVSA

GROUP	MEMBER	SYSTEM	REQ FROM MVSA	REQ TO MVSA
AOFSMGRP	NVBES	MVSB	0	0
	NVCES	MVSC	0	0
	PRIMARY	MVSC	0	0
TOTAL			0	0
BBGROUP	MVSC	MVSC	0	0
TOTAL			0	0
CFXCFMON	MVSB	MVSB	954	0
	MVSC	MVSC	0	0
TOTAL			954	0
COFVLFNO	MVSB	MVSB	12	104
	MVSC	MVSC	12	0
TOTAL			24	104
DFHIR000	DBDECIBQ	MVSB	0	0
	DBPECIAF	MVSC	2,564	2,562
	DBPECIAG	MVSC	536	520
	DBPECIAM	MVSC	24,082	24,082
	DBPECIAN	MVSC	13	13
	DBPECIAY	MVSB	0	0
	DBPECIAZ	MVSC	557	557
	DBPECIA1	MVSC	334	334
	DBPECIA2	MVSC	573	573
	DBPECIA3	MVSC	339	339
	DBPECIA5	MVSC	3,840	3,840
	DBPECIA6	MVSC	0	0
	DBPECIA9	MVSC	598	598
	DBPECIBQ	MVSC	0	0
	DBPECIHD	MVSC	1,433	1,434
	DBPECIHV	MVSC	719	719
	DBPECIKS	MVSC	0	0
	DBSECIAB	MVSC	0	0

MEMBERS ON MVSA

GROUP	MEMBER	REQ OUT	REQ IN
AOFSMGRP	NVAES	0	0
TOTAL		0	0
BBGROUP	MVSA	0	0
TOTAL		0	0
CFXCFMON	MVSA	954	0
TOTAL		954	0
COFVLFNO	MVSA	24	104
TOTAL		24	104
DFHIR000	DBPECIAB	0	0
	DBPECIAC	0	0
	DBPECIAD	0	0
	DBPECIAE	0	0
	DBPECIAI	202	202
	DBPECIAJ	0	0
	DBPECIAK	183	183
	DBPECIAL	4,145	4,146
	DBPECIAP	0	0
	DBPECIAQ	0	0
	DBPECIAS	0	0
	DBPECIAT	0	0
	DBPECIAU	0	0
	DBPECIAV	148	148
	DBPECIA0	0	0
	DBPECIA4	24,008	24,008
	DBPECIA7	0	0
	DBPECIHB	347	347

Figure 13. RMF XCF Activity Report - XCF Usage by Member - MVSA (1)

```
                                                X C F  A C T I V I T Y
                                                                                                                        PAGE    3
          OS/390               SYSTEM ID MVSA         DATE 04/08/1998          INTERVAL 10.00.000
          REL. 01.03.00        RPT VERSION 1.3.0      TIME 09.00.00            CYCLE 1.000 SECONDS


                                                XCF USAGE BY MEMBER
-----------------------------------------------------------------------------------------------------------------------------------

            MEMBERS COMMUNICATING WITH MVSA                                                       MEMBERS ON MVSA
-----------------------------------------------------------------          ------------------------------------------------------

                                                REQ        REQ
                                               FROM         TO                                                       REQ        REQ
GROUP     MEMBER           SYSTEM              MVSA       MVSA          GROUP     MEMBER                             OUT         IN

DFHIR000  DBSECIAC         MVSC                   0          0          DFHIR000  DBPECIHC                            47         47
(CONT)    DBSECIAD         MVSC                   0          0          (CONT)    DBPECIHE                           373        373
          DBSECIAE         MVSC                   0          0                    DBPECIHG                             0          0
          DBSECIAF         MVSC                   0          0                    DBPECIHK                             0          0
          DBSECIAG         MVSC                   0          0                    DBPECIHM                             0          0
          DBSECIAI         MVSC                   0          0                    DBPECIHS                             0          0
          DBSECIAJ         MVSC                   0          0                    DBPECIHU                             0          0
          DBSECIAK         MVSC                   0          0                    DBPECIH1                         5,177      5,160
          DBSECIAL         MVSC                   0          0                    DBPECIOA                             0          0
          DBSECIAN         MVSC                   0          0                    DBPECIOB                           955        954
          DBSECIAP         MVSC                   0          0                    DBPECIOC                             3          3
          DBSECIAQ         MVSC                   0          0                    DBP1CICS                             0          0
          DBSECIAS         MVSC                   0          0                    DBP2CICS                             0          0
          DBSECIAT         MVSC                   0          0                    DBP3CICS                             0          0
          DBSECIAU         MVSC                   0          0                                                ---------- ----------
          DBSECIAW         MVSC                   0          0          TOTAL                                     35,588     35,571
          DBSECIAY         MVSC                   0          0
          DBSECIAZ         MVSC                   0          0
          DBSECIA1         MVSC                   0          0
          DBSECIA2         MVSC                   0          0
          DBSECIA3         MVSC                   0          0
          DBSECIA7         MVSC                   0          0
          DBSECIHB         MVSC                   0          0
          DBSECIHC         MVSC                   0          0
          DBSECIHD         MVSC                   0          0
          DBSECIHE         MVSC                   0          0
          DBSECIHG         MVSC                   0          0
          DBSECIHM         MVSC                   0          0
          DBSECIHS         MVSC                   0          0
          DBSECIH1         MVSC                   0          0
          DBSECIKS         MVSC                   0          0
          DBSECIOB         MVSC                   0          0
          DBSECI2F         MVSC                   0          0
          DBSECI2S         MVSC                   0          0
          DBSECI21         MVSC                   0          0
          DBSECI3F         MVSC                   0          0
          DBSECI3S         MVSC                   0          0
          DBSECI31         MVSC                   0          0
```

Figure 14. RMF XCF Activity Report - XCF Usage by Member - MVSA (2)

```
                                                     X C F   A C T I V I T Y
                                                                                                                        PAGE    4
          OS/390                 SYSTEM ID MVSA            DATE 04/08/1998            INTERVAL 10.00.000
          REL. 01.03.00          RPT VERSION 1.3.0         TIME 09.00.00              CYCLE 1.000 SECONDS



                                                     XCF USAGE BY MEMBER
-----------------------------------------------------------------------------------------------------------------------------------

               MEMBERS COMMUNICATING WITH MVSA                                                  MEMBERS ON MVSA
-----------------------------------------------------------------            -----------------------------------------------------

                                                REQ          REQ
                                               FROM           TO                                                        REQ        REQ
GROUP       MEMBER              SYSTEM         MVSA         MVSA             GROUP       MEMBER                         OUT         IN

DFHIR000    DBSECI4F            MVSC              0            0
(CONT)      DBSECI4S            MVSC              0            0
            DBSECI41            MVSC              0            0
            DBSECI5F            MVSC              0            0
            DBSECI5S            MVSC              0            0
            DBSECI51            MVSC              0            0
            DBSECI6F            MVSC              0            0
            DBSECI6S            MVSC              0            0
            DBSECI61            MVSC              0            0
            DBTBCIBA            MVSB              0            0
            DBTBCIBB            MVSB              0            0
            DBTBCIBC            MVSB              0            0
            DBTBCIBN            MVSB              0            0
            DBTBCIBS            MVSB              0            0
            DBTBCIB1            MVSB              0            0
            DBTECIAK            MVSB              0            0
            DBTECIAN            MVSB              0            0
            DBTECIAR            MVSB              0            0
            DBTECIAU            MVSB              0            0
            DBTECIA1            MVSB              0            0
            DBTECIA2            MVSB              0            0
            DBTECIA7            MVSB              0            0
            DBTECIEA            MVSB              0            0
            DBTECIE1            MVSB              0            0
            DBTECIH1            MVSB              0            0
            DBTECIH2            MVSB              0            0
                                         ----------   ----------
TOTAL                                        35,588       35,571

DSNGED0     DB2INMVSDEDA        MVSB              0            0
            DB2INMVSDED2        MVSB              0            0
                                         ----------   ----------
TOTAL                                             0            0

DSNGEP0     DB2INMVSDEP2        MVSC              0            0             DSNGEP0     DB2INMVSDB2P                     0          0
                                         ----------   ----------                                                ----------   --------
TOTAL                                             0            0             TOTAL                                        0          0
```

Figure 15. RMF XCF Activity Report - XCF Usage by Member - MVSA (3)

```
                                                 X C F   A C T I V I T Y
                                                                                                             PAGE    5
          OS/390              SYSTEM ID MVSA           DATE 04/08/1998          INTERVAL 10.00.000
          REL. 01.03.00       RPT VERSION 1.3.0        TIME 09.00.00            CYCLE 1.000 SECONDS


                                                 XCF USAGE BY MEMBER
-----------------------------------------------------------------------------------------------------------------------------------

            MEMBERS COMMUNICATING WITH MVSA                                                   MEMBERS ON MVSA
-----------------------------------------------------------------        -----------------------------------------------------

                                                REQ        REQ
                                               FROM         TO                                                       REQ        REQ
GROUP     MEMBER              SYSTEM           MVSA       MVSA          GROUP     MEMBER                             OUT         IN

DSNGER0   DB2INMVSDER2        MVSB                0          0
          DB2INMVSDESH        MVSB                0          0
                                         ----------  ----------
TOTAL                                             0          0

DSNGES0   DB2INMVSDB2S        MVSB                0          0
          DB2INMVSDES2        MVSC                0          0
                                         ----------  ----------
TOTAL                                             0          0

DSNGET0   DB2INMVSDB2T        MVSB                0          0
          DB2INMVSDET2        MVSC                0          0
                                         ----------  ----------
TOTAL                                             0          0

DXRIED0   DXRIED0$$IEDA001    MVSB                0          0
          DXRIED0$$IED2002    MVSB                0          0
                                         ----------  ----------
TOTAL                                             0          0

DXRIEP0   DXRIEP0$$IEP2002    MVSC            1,895      1,893          DXRIEP0   DXRIEP0$$PRLM001                1,895      1,893
                                         ----------  ----------                                              ----------  ---------
TOTAL                                         1,895      1,893          TOTAL                                     1,895      1,893

DXRIER0   DXRIER0$$IER2002    MVSB                0          0
          DXRIER0$$IESH001    MVSB                0          0
                                         ----------  ----------
TOTAL                                             0          0

DXRIES0   DXRIES0$$IES2002    MVSC                0          0
          DXRIES0$$SRLM001    MVSB                0          0
                                         ----------  ----------
TOTAL                                             0          0

DXRIET0   DXRIET0$$IET2002    MVSC                0          0
          DXRIET0$$TRLM001    MVSB                0          0
                                         ----------  ----------
TOTAL                                             0          0
```

Figure 16. RMF XCF Activity Report - XCF Usage by Member - MVSA (4)

```
                                        X C F  A C T I V I T Y
                                                                                                         PAGE    6
         OS/390                 SYSTEM ID MVSA             DATE 04/08/1998            INTERVAL 10.00.000
         REL. 01.03.00          RPT VERSION 1.3.0          TIME 09.00.00              CYCLE 1.000 SECONDS


                                        XCF USAGE BY MEMBER
-----------------------------------------------------------------------------------------------------------------------

           MEMBERS COMMUNICATING WITH MVSA                                              MEMBERS ON MVSA
-----------------------------------------------------------------            ----------------------------------------------------

                                            REQ          REQ
                                           FROM           TO                                                        REQ        REQ
GROUP      MEMBER            SYSTEM        MVSA         MVSA            GROUP       MEMBER                          OUT         IN

ISTCFS01   DKDDBM07DKDDBN00  MVSB             0            0            ISTCFS01    DKDDBM06DKDDBN00                  0          0
           DKDDBM08DKDDBN00  MVSC             0            0                                                 ---------- ---------
                                     ----------   ----------            TOTAL                                             0          0
TOTAL                                         0            0

ISTXCF     DKDDBM07DKDDBN00  MVSB            93           93            ISTXCF      DKDDBM06DKDDBN00                191        192
           DKDDBM08DKDDBN00  MVSC            98           99                                                 ---------- ---------
                                     ----------   ----------            TOTAL                                           191        192
TOTAL                                       191          192

IXCLO004   M17               MVSB             0            0
           M18               MVSB             0            0
                                     ----------   ----------
TOTAL                                         0            0

IXCLO007   M60               MVSB             0            0
           M61               MVSC             0            0
                                     ----------   ----------
TOTAL                                         0            0

IXCLO010   M88               MVSC             0            0
           M90               MVSB             0            0
                                     ----------   ----------
TOTAL                                         0            0

IXCLO019   M44               MVSB             0            0
           M45               MVSB             0            0
                                     ----------   ----------
TOTAL                                         0            0

IXCLO022   M78               MVSC             0            0            IXCLO022    M77                               0          0
           M79               MVSB             0            0                                                 ---------- ---------
                                     ----------   ----------            TOTAL                                             0          0
TOTAL                                         0            0

IXCLO03B   M49               MVSC        15,065       14,498            IXCLO03B    M48                          30,370     29,802
                                     ----------   ----------                                                 ---------- ---------
TOTAL                                    15,065       14,498            TOTAL                                        30,370     29,802
```

Figure 17. RMF XCF Activity Report - XCF Usage by Member - MVSA (5)

```
                                              X C F  A C T I V I T Y
                                                                                                    PAGE    7
          OS/390              SYSTEM ID MVSA          DATE 04/08/1998          INTERVAL 10.00.000
          REL. 01.03.00       RPT VERSION 1.3.0       TIME 09.00.00            CYCLE 1.000 SECONDS


                                              XCF USAGE BY MEMBER
-----------------------------------------------------------------------------------------------------------------

            MEMBERS COMMUNICATING WITH MVSA                                          MEMBERS ON MVSA
-----------------------------------------------------------------         ----------------------------------------------------

                                                REQ        REQ
                                               FROM         TO                                              REQ        REQ
GROUP     MEMBER           SYSTEM              MVSA       MVSA          GROUP     MEMBER                    OUT         IN

JESEJBY   DBP0JES2$MVSB    MVSB               1,559      1,559          JESEJBY   DBP0JES2$MVSA           2,955      2,954
          DBP0JES2$MVSC    MVSC               1,396      1,396                                       ---------- ---------
                                         ---------- ----------          TOTAL                             2,955      2,954
TOTAL                                         2,955      2,955

LSRVLSVP  LCOMMVSB         MVSB                   4          4          LSRVLSVP  LCOMMVSA                    8          8
          LCOMMVSC         MVSC                   4          4                                       ---------- ---------
                                         ---------- ----------          TOTAL                                 8          8
TOTAL                                             8          8

LSRVLSVT  LCOMMVSB         MVSB                   0          0
                                         ---------- ----------
TOTAL                                             0          0

OPCOPPC   CONTR            MVSB                   0          0
                                         ---------- ----------
TOTAL                                             0          0

OPCOPSC   CONTR            MVSB                   0          0
                                         ---------- ----------
TOTAL                                             0          0

OPCOPTC   CONTROL          MVSB                   0          0
                                         ---------- ----------
TOTAL                                             0          0

STRBEDDB  MVSB             MVSB                   0          0          STRBEDDB  MVSA                        0          0
          MVSC             MVSC                   0          0                                       ---------- --------
                                         ---------- ----------          TOTAL                                 0          0
TOTAL                                             0          0
                                                                        SYSATB01  M51                         0          0
                                                                                  M52                         0          0
                                                                                                     ---------- --------
                                                                        TOTAL                                 0          0
SYSATB02  M38              MVSC                   0          0
          M39              MVSC                   0          0
                                         ---------- ----------
TOTAL                                             0          0
```

Figure 18. RMF XCF Activity Report - XCF Usage by Member - MVSA (6)

```
                                                X C F   A C T I V I T Y
                                                                                                               PAGE    8
            OS/390                   SYSTEM ID MVSA            DATE 04/08/1998           INTERVAL 10.00.000
            REL. 01.03.00            RPT VERSION 1.3.0         TIME 09.00.00             CYCLE 1.000 SECONDS


                                                XCF USAGE BY MEMBER
-----------------------------------------------------------------------------------------------------------------------------------

               MEMBERS COMMUNICATING WITH MVSA                                                 MEMBERS ON MVSA
-----------------------------------------------------------------            -----------------------------------------------------

                                                    REQ          REQ
                                                   FROM           TO                                                   REQ        REQ
GROUP       MEMBER              SYSTEM             MVSA         MVSA         GROUP       MEMBER                        OUT         IN

SYSATB03    M49                 MVSB                  0            0
            M50                 MVSB                  0            0
            M54                 MVSB                  0            0
            M55                 MVSB                  0            0
                                             ----------   ----------
TOTAL                                                 0            0

SYSDAE      MVSB                MVSB                  0            0         SYSDAE      MVSA                            0          0
            MVSC                MVSC                  0            0                                              ---------- ----------
                                             ----------   ----------         TOTAL                                       0          0
TOTAL                                                 0            0

SYSENF      MVSB                MVSB                  0            0         SYSENF      MVSA                            0          0
            MVSC                MVSC                  0            0                                              ---------- ----------
                                             ----------   ----------         TOTAL                                       0          0
TOTAL                                                 0            0

SYSGRS      MVSB                MVSB             96,292       96,292         SYSGRS      MVSA                      192,583    192,583
            MVSC                MVSC             96,291       96,291                                              ---------- ----------
                                             ----------   ----------         TOTAL                                 192,583    192,583
TOTAL                                           192,583      192,583

SYSIGW00    IGWCLM01MVSB        MVSB                  2            2         SYSIGW00    IGWCLM01MVSA                    2          2
            IGWCLM01MVSC        MVSC                  0            0                                              ---------- ----------
                                             ----------   ----------         TOTAL                                       2          2
TOTAL                                                 2            2

SYSIGW01    IGWCLM01MVSB        MVSB                  0            0         SYSIGW01    IGWCLM01MVSA                    0          0
            IGWCLM01MVSC        MVSC                  0            0                                              ---------- ----------
                                             ----------   ----------         TOTAL                                       0          0
TOTAL                                                 0            0

SYSIKJBC    MVSB                MVSB                  0            0         SYSIKJBC    MVSA                            0          0
            MVSC                MVSC                  0            0                                              ---------- ----------
                                             ----------   ----------         TOTAL                                       0          0
TOTAL                                                 0            0

SYSJES      MVSB                MVSB                  0            0         SYSJES      MVSA                            0          0
            MVSC                MVSC                  0            0                                              ---------- ----------
                                             ----------   ----------         TOTAL                                       0          0
TOTAL                                                 0            0
```

Figure 19. RMF XCF Activity Report - XCF Usage by Member - MVSA (7)

```
                                              X C F   A C T I V I T Y
                                                                                                      PAGE    9
          OS/390               SYSTEM ID MVSA           DATE 04/08/1998           INTERVAL 10.00.000
          REL. 01.03.00        RPT VERSION 1.3.0        TIME 09.00.00             CYCLE 1.000 SECONDS


                                              XCF USAGE BY MEMBER
-----------------------------------------------------------------------------------------------------------------

           MEMBERS COMMUNICATING WITH MVSA                                          MEMBERS ON MVSA
-----------------------------------------------------------------         -------------------------------------------------

                                                    REQ        REQ
                                                    FROM       TO                                                REQ        REQ
GROUP      MEMBER               SYSTEM              MVSA       MVSA       GROUP      MEMBER                      OUT        IN

SYSMCS     MVSB                 MVSB                  42         93       SYSMCS     MVSA                         84        106
           MVSC                 MVSC                  42         13                                       ---------- ---------
                                              ---------- ----------       TOTAL                                   84        106
TOTAL                                                 84        106

SYSMCS2    MVSB                 MVSB                   0          0       SYSMCS2    MVSA                          0          0
           MVSC                 MVSC                   0          0                                       ---------- ---------
                                              ---------- ----------       TOTAL                                    0          0
TOTAL                                                  0          0

SYSRMF     SYSRMF@@MVSB         MVSB                   0          0       SYSRMF     SYSRMF@@MVSA                  0          0
           SYSRMF@@MVSC         MVSC                   0          0                                       ----------  --------
                                              ---------- ----------       TOTAL                                    0          0
TOTAL                                                  0          0

SYSWLM     MVSB                 MVSB                 112        113       SYSWLM     MVSA                        224        226
           MVSC                 MVSC                 112        113                                       ----------  --------
                                              ---------- ----------       TOTAL                                  224        226
TOTAL                                                224        226
```

Figure 20. RMF XCF Activity Report - XCF Usage by Member - MVSA (8)

```
                                              X C F   A C T I V I T Y
                                                                                                      PAGE   10
          OS/390               SYSTEM ID MVSA           DATE 04/08/1998           INTERVAL 10.00.000
          REL. 01.03.00        RPT VERSION 1.3.0        TIME 09.00.00             CYCLE 1.000 SECONDS


TOTAL SAMPLES = 596                            XCF PATH STATISTICS
-----------------------------------------------------------------------------------------------------------------

                          OUTBOUND FROM MVSA                                                   INBOUND TO MVSA
----------------------------------------------------------------------------------     --------------------------------------
        T FROM/TO                                   R                                         T FROM/TO                   Q
 TO     Y DEVICE, OR     TRANSPORT      REQ     AVG Q                                   FROM   Y DEVICE, OR       REQ BUFFERS
 SYSTEM P STRUCTURE      CLASS          OUT     LNGTH    AVAIL    BUSY   RETRY          SYSTEM P STRUCTURE         IN UNAVAIL


 MVSB   C 05C1 TO 05D1   DEFAULT     50,733      0.02   50,733       0       0          MVSB   C 05D0 TO 05C0   43,901     0
        C 05C9 TO 05D9   DEFAULT     48,689      0.03   48,689       0       0                 C 05D8 TO 05C8   54,980     0
 MVSC   C 05CB TO 05EB   DEFAULT     49,873      0.03   49,060     813       0          MVSC   C 05EA TO 05CA   77,316     0
        C 05C3 TO 05E3   DEFAULT    100,687      0.07   99,394   1,293       0                 C 05E2 TO 05C2   72,703     0
                                 ----------                                                                 ----------
 TOTAL                              249,982                                             TOTAL                  248,900
```

Figure 21. RMF XCF Activity Report - XCF Path Statistics - MVSA

For more information on R, refer to page 31
For more information on Q, refer to page 30

```
                                             X C F  A C T I V I T Y
                                                                                                            PAGE    1
         OS/390                SYSTEM ID MVSB            DATE 04/08/1998            INTERVAL 10.00.000
         REL. 01.03.00         RPT VERSION 1.3.0         TIME 09.00.00              CYCLE 1.000 SECONDS


                                                XCF USAGE BY SYSTEM
-----------------------------------------------------------------------------------------------------------------------

                                    REMOTE SYSTEMS                                                          LOCAL
----------------------------------------------------------------------------------------------    ---------------

                        OUTBOUND FROM MVSB                                    INBOUND TO MVSB                MVSB
--------------------------------------------------------------------  ------------------------    ---------------

                                     ----- BUFFER -----      ALL
TO        TRANSPORT  BUFFER       REQ   %    %    %    %    PATHS     REQ  FROM          REQ     REQ    TRANSPORT     REQ
SYSTEM    CLASS      LENGTH       OUT  SML  FIT  BIG  OVR  UNAVAIL  REJECT  SYSTEM        IN  REJECT    CLASS      REJECT

MVSA      DEFAULT    16,316       255  100    0    0    0        0       0  MVSA      99,069       0    DEFAULT         0
          DEFSMALL      956    98,004    0  100    0    0   98,004       0                            DEFSMALL        0
MVSC      DEFAULT    16,316        80  100    0    0    0        0       0  MVSC     102,272       0
          DEFSMALL      956   100,639    0  100    0    0  100,639       0
                             ----------                                          ----------
TOTAL                         198,978                                   TOTAL    201,341
```

Figure 22. RMF XCF Activity Report - XCF Usage by System - MVSB

```
                                        X C F  A C T I V I T Y
                                                                                          PAGE    2
         OS/390                SYSTEM ID MVSB            DATE 04/08/1998           INTERVAL 10.00.000
         REL. 01.03.00         RPT VERSION 1.3.0         TIME 09.00.00             CYCLE 1.000 SECONDS


                                        XCF USAGE BY MEMBER
-----------------------------------------------------------------------------------------------------

           MEMBERS COMMUNICATING WITH MVSB                                     MEMBERS ON MVSB
-----------------------------------------------------------------       ------------------------------------------------------

                                         REQ       REQ
                                        FROM        TO                                             REQ        REQ
GROUP     MEMBER          SYSTEM        MVSB      MVSB          GROUP     MEMBER                   OUT         IN

AOFSMGRP  NVAES           MVSA             0         0          AOFSMGRP  NVBES                      0          0
          NVCES           MVSC             0         0                                      ----------  ---------
          PRIMARY         MVSC             0         0          TOTAL                                0          0
                                  ----------  ----------
TOTAL                                      0         0

BBGROUP   MVSA            MVSA             0         0
          MVSC            MVSC             0         0
                                  ----------  ----------
TOTAL                                      0         0

CFXCFMON  MVSA            MVSA             0       954          CFXCFMON  MVSB                       0      2,670
          MVSC            MVSC             0     1,716                                      ----------  ---------
                                  ----------  ----------        TOTAL                                0      2,670
TOTAL                                      0     2,670

COFVLFNO  MVSA            MVSA           104        12          COFVLFNO  MVSB                     208         12
          MVSC            MVSC           104         0                                      ----------  ---------
                                  ----------  ----------        TOTAL                              208         12
TOTAL                                    208        12

DFHIR000  DBPECIAB        MVSA             0         0          DFHIR000  DBDECIBQ                   0          0
          DBPECIAC        MVSA             0         0                    DBPECIAY                   0          0
          DBPECIAD        MVSA             0         0                    DBTBCIBA                   0          0
          DBPECIAE        MVSA             0         0                    DBTBCIBB                   0          0
          DBPECIAF        MVSC             0         0                    DBTBCIBC                   0          0
          DBPECIAG        MVSC             0         0                    DBTBCIBN                   0          0
          DBPECIAI        MVSA             0         0                    DBTBCIBS                   0          0
          DBPECIAJ        MVSA             0         0                    DBTBCIB1                   0          0
          DBPECIAK        MVSA             0         0                    DBTECIAK                   0          0
          DBPECIAL        MVSA             0         0                    DBTECIAN                   0          0
          DBPECIAM        MVSC             0         0                    DBTECIAR                   0          0
          DBPECIAN        MVSC             0         0                    DBTECIAU                   0          0
          DBPECIAP        MVSA             0         0                    DBTECIA1                   0          0
          DBPECIAQ        MVSA             0         0                    DBTECIA2                   0          0
          DBPECIAS        MVSA             0         0                    DBTECIA7                   0          0
          DBPECIAT        MVSA             0         0                    DBTECIEA                   0          0
          DBPECIAU        MVSA             0         0                    DBTECIE1                   0          0
```

Figure 23. RMF XCF Activity Report - XCF Usage by Member - MVSB (1)

```
                                            X C F   A C T I V I T Y
                                                                                                          PAGE    3
           OS/390                SYSTEM ID MVSB              DATE 04/08/1998              INTERVAL 10.00.000
           REL. 01.03.00         RPT VERSION 1.3.0           TIME 09.00.00                CYCLE 1.000 SECONDS



                                            XCF USAGE BY MEMBER
-----------------------------------------------------------------------------------------------------------------------

              MEMBERS COMMUNICATING WITH MVSB                                              MEMBERS ON MVSB
-----------------------------------------------------------------           -----------------------------------------------------

                                                 REQ          REQ
                                                 FROM         TO                                                  REQ         REQ
GROUP      MEMBER               SYSTEM           MVSB         MVSB          GROUP      MEMBER                     OUT          IN

DFHIR000   DBPECIAV             MVSA                0            0          DFHIR000   DBTECIH1                     0           0
(CONT)     DBPECIAZ             MVSC                0            0          (CONT)     DBTECIH2                     0           0
           DBPECIA0             MVSA                0            0                                         ---------- ----------
           DBPECIA1             MVSC                0            0          TOTAL                                   0           0
           DBPECIA2             MVSC                0            0
           DBPECIA3             MVSC                0            0
           DBPECIA4             MVSA                0            0
           DBPECIA5             MVSC                0            0
           DBPECIA6             MVSC                0            0
           DBPECIA7             MVSA                0            0
           DBPECIA9             MVSC                0            0
           DBPECIBQ             MVSC                0            0
           DBPECIHB             MVSA                0            0
           DBPECIHC             MVSA                0            0
           DBPECIHD             MVSC                0            0
           DBPECIHE             MVSA                0            0
           DBPECIHG             MVSA                0            0
           DBPECIHK             MVSA                0            0
           DBPECIHM             MVSA                0            0
           DBPECIHS             MVSA                0            0
           DBPECIHU             MVSA                0            0
           DBPECIHV             MVSC                0            0
           DBPECIH1             MVSA                0            0
           DBPECIKS             MVSC                0            0
           DBPECIOA             MVSA                0            0
           DBPECIOB             MVSA                0            0
           DBPECIOC             MVSA                0            0
           DBP1CICS             MVSA                0            0
           DBP2CICS             MVSA                0            0
           DBP3CICS             MVSA                0            0
           DBSECIAB             MVSC                0            0
           DBSECIAC             MVSC                0            0
           DBSECIAD             MVSC                0            0
           DBSECIAE             MVSC                0            0
           DBSECIAF             MVSC                0            0
           DBSECIAG             MVSC                0            0
           DBSECIAI             MVSC                0            0
           DBSECIAJ             MVSC                0            0
```

Figure 24. RMF XCF Activity Report - XCF Usage by Member - MVSB (2)

X C F A C T I V I T Y

PAGE 4

OS/390 SYSTEM ID MVSB DATE 04/08/1998 INTERVAL 10.00.000
REL. 01.03.00 RPT VERSION 1.3.0 TIME 09.00.00 CYCLE 1.000 SECONDS

XCF USAGE BY MEMBER

MEMBERS COMMUNICATING WITH MVSB					MEMBERS ON MVSB			
GROUP	MEMBER	SYSTEM	REQ FROM MVSB	REQ TO MVSB	GROUP	MEMBER	REQ OUT	REQ IN
DFHIR000	DBSECIAK	MVSC	0	0				
(CONT)	DBSECIAL	MVSC	0	0				
	DBSECIAN	MVSC	0	0				
	DBSECIAP	MVSC	0	0				
	DBSECIAQ	MVSC	0	0				
	DBSECIAS	MVSC	0	0				
	DBSECIAT	MVSC	0	0				
	DBSECIAU	MVSC	0	0				
	DBSECIAW	MVSC	0	0				
	DBSECIAY	MVSC	0	0				
	DBSECIAZ	MVSC	0	0				
	DBSECIA1	MVSC	0	0				
	DBSECIA2	MVSC	0	0				
	DBSECIA3	MVSC	0	0				
	DBSECIA7	MVSC	0	0				
	DBSECIHB	MVSC	0	0				
	DBSECIHC	MVSC	0	0				
	DBSECIHD	MVSC	0	0				
	DBSECIHE	MVSC	0	0				
	DBSECIHG	MVSC	0	0				
	DBSECIHM	MVSC	0	0				
	DBSECIHS	MVSC	0	0				
	DBSECIH1	MVSC	0	0				
	DBSECIKS	MVSC	0	0				
	DBSECIOB	MVSC	0	0				
	DBSECI2F	MVSC	0	0				
	DBSECI2S	MVSC	0	0				
	DBSECI21	MVSC	0	0				
	DBSECI3F	MVSC	0	0				
	DBSECI3S	MVSC	0	0				
	DBSECI31	MVSC	0	0				
	DBSECI4F	MVSC	0	0				
	DBSECI4S	MVSC	0	0				
	DBSECI41	MVSC	0	0				
	DBSECI5F	MVSC	0	0				
	DBSECI5S	MVSC	0	0				
	DBSECI51	MVSC	0	0				
	DBSECI6F	MVSC	0	0				

Figure 25. RMF XCF Activity Report - XCF Usage by Member - MVSB (3)

```
                                              X C F   A C T I V I T Y
                                                                                                          PAGE    5
         OS/390                SYSTEM ID MVSB           DATE 04/08/1998          INTERVAL 10.00.000
         REL. 01.03.00         RPT VERSION 1.3.0        TIME 09.00.00            CYCLE 1.000 SECONDS


                                              XCF USAGE BY MEMBER
-------------------------------------------------------------------------------------------------------------------------------------

           MEMBERS COMMUNICATING WITH MVSB                                            MEMBERS ON MVSB
-----------------------------------------------------------------            -----------------------------------------------------

                                          REQ          REQ
                                         FROM           TO                                                          REQ        REQ
GROUP       MEMBER              SYSTEM     MVSB         MVSB           GROUP       MEMBER                           OUT         IN

DFHIR000    DBSECI6S            MVSC          0            0
(CONT)      DBSECI61            MVSC          0            0
                                       ----------   ----------
TOTAL                                         0            0

                                                                       DSNGED0     DB2INMVSDEDA                       0          0
                                                                                   DB2INMVSDED2                       0          0
                                                                                                             ---------- ----------
                                                                       TOTAL                                          0          0

DSNGEP0     DB2INMVSDB2P        MVSA          0            0
            DB2INMVSDEP2        MVSC          0            0
                                       ----------   ----------
TOTAL                                         0            0

                                                                       DSNGER0     DB2INMVSDER2                       0          0
                                                                                   DB2INMVSDESH                       0          0
                                                                                                             ---------- ----------
                                                                       TOTAL                                          0          0

DSNGES0     DB2INMVSDES2        MVSC          0            0           DSNGES0     DB2INMVSDB2S                       0          0
                                       ----------   ----------                                               ---------- ----------
TOTAL                                         0            0           TOTAL                                          0          0

DSNGET0     DB2INMVSDET2        MVSC          0            0           DSNGET0     DB2INMVSDB2T                       0          0
                                       ----------   ----------                                               ---------- ----------
TOTAL                                         0            0           TOTAL                                          0          0

                                                                       DXRIED0     DXRIED0$$IEDA001                 250        250
                                                                                   DXRIED0$$IED2002                 250        250
                                                                                                             ---------- ----------
                                                                       TOTAL                                        500        500
DXRIEP0     DXRIEP0$$IEP2002    MVSC          0            0
            DXRIEP0$$PRLM001    MVSA          0            0
                                       ----------   ----------
TOTAL                                         0            0
```

Figure 26. RMF XCF Activity Report - XCF Usage by Member - MVSB (4)

```
                                        X C F  A C T I V I T Y
                                                                                                   PAGE    6
        OS/390              SYSTEM ID MVSB             DATE 04/08/1998           INTERVAL 10.00.000
        REL. 01.03.00       RPT VERSION 1.3.0          TIME 09.00.00             CYCLE 1.000 SECONDS


                                          XCF USAGE BY MEMBER
-------------------------------------------------------------------------------------------------------------

          MEMBERS COMMUNICATING WITH MVSB                                          MEMBERS ON MVSB
-----------------------------------------------------         -----------------------------------------------

                                        REQ        REQ
                                        FROM       TO                                                REQ        REQ
GROUP     MEMBER             SYSTEM     MVSB       MVSB         GROUP     MEMBER                     OUT        IN
                                                                DXRIER0   DXRIER0$$IER2002           248        248
                                                                          DXRIER0$$IESH001           248        248
                                                                                              ---------- ----------
                                                                TOTAL                                496        496

DXRIES0   DXRIES0$$IES2002   MVSC        469        469         DXRIES0   DXRIES0$$SRLM001           469        469
                                  ---------- ----------                                      ---------- ----------
TOTAL                                    469        469         TOTAL                                469        469

DXRIET0   DXRIET0$$IET2002   MVSC        425        425         DXRIET0   DXRIET0$$TRLM001           425        425
                                  ---------- ----------                                      ---------- ----------
TOTAL                                    425        425         TOTAL                                425        425

ISTCFS01  DKDDBM06DKDDBN00   MVSA          0          0         ISTCFS01  DKDDBM07DKDDBN00             0          0
          DKDDBM08DKDDBN00   MVSC          0          0                                       ---------- ----------
                                  ---------- ----------         TOTAL                                  0          0
TOTAL                                      0          0

ISTXCF    DKDDBM06DKDDBN00   MVSA         93         93         ISTXCF    DKDDBM07DKDDBN00           193        190
          DKDDBM08DKDDBN00   MVSC        100         97                                       ----------  ---------
                                  ---------- ----------         TOTAL                                193        190
TOTAL                                    193        190

                                                                IXCLO004  M17                         88         78
                                                                          M18                         25         35
                                                                                              ----------  ---------
                                                                TOTAL                                113        113


IXCLO007  M61                MVSC        397        342         IXCLO007  M60                        992        937
                                  ---------- ----------                                      ----------  ---------
TOTAL                                    397        342         TOTAL                                992        937

IXCLO010  M88                MVSC        718        797         IXCLO010  M90                        871        950
                                  ---------- ----------                                      ----------  ---------
TOTAL                                    718        797         TOTAL                                871        950

                                                                IXCLO019  M44                        231        232
                                                                          M45                        136        135
                                                                                              ----------  ---------
                                                                TOTAL                                367        367
```

Figure 27. RMF XCF Activity Report - XCF Usage by Member - MVSB (5)

```
                                                     X C F   A C T I V I T Y
                                                                                                             PAGE    7
          OS/390                 SYSTEM ID MVSB              DATE 04/08/1998            INTERVAL 10.00.000
          REL. 01.03.00          RPT VERSION 1.3.0           TIME 09.00.00              CYCLE 1.000 SECONDS


                                                     XCF USAGE BY MEMBER
-------------------------------------------------------------------------------------------------------------------------------

            MEMBERS COMMUNICATING WITH MVSB                                                 MEMBERS ON MVSB
-----------------------------------------------------------------            ----------------------------------------------------

                                             REQ         REQ
                                             FROM        TO                                                      REQ        REQ
GROUP       MEMBER              SYSTEM       MVSB        MVSB            GROUP       MEMBER                      OUT         IN

IXCLO022    M77                 MVSA            0           0            IXCLO022    M79                           0          0
            M78                 MVSC            0           0                                             ---------- ---------
                                       ---------- ----------            TOTAL                                         0          0
TOTAL                                           0           0

IXCLO03B    M48                 MVSA            0           0
            M49                 MVSC            0           0
                                       ---------- ----------
TOTAL                                           0           0

JESEJBY     DBP0JES2$MVSA       MVSA        1,559       1,559            JESEJBY     DBP0JES2$MVSB             3,567      3,567
            DBP0JES2$MVSC       MVSC        2,008       2,008                                             ---------- ---------
                                       ---------- ----------            TOTAL                                     3,567      3,567
TOTAL                                       3,567       3,567

LSRVLSVP    LCOMMVSA            MVSA            4           4            LSRVLSVP    LCOMMVSB                      8          8
            LCOMMVSC            MVSC            4           4                                             ---------- ---------
                                       ---------- ----------            TOTAL                                         8          8
TOTAL                                           8           8


                                                                         LSRVLSVT    LCOMMVSB                      0          0
                                                                                                          ---------- ---------
                                                                         TOTAL                                         0          0

                                                                         OPCOPPC     CONTR                         0          0
                                                                                                          ---------- ---------
                                                                         TOTAL                                         0          0

                                                                         OPCOPSC     CONTR                         0          0
                                                                                                          ---------- ---------
                                                                         TOTAL                                         0          0

                                                                         OPCOPTC     CONTROL                       0          0
                                                                                                          ---------- ----------
                                                                         TOTAL                                         0          0

STRBEDDB    MVSA                MVSA            0           0            STRBEDDB    MVSB                          0          0
            MVSC                MVSC            0           0                                             ---------- ----------
                                       ---------- ----------            TOTAL                                         0          0
TOTAL                                           0           0
```

Figure 28. RMF XCF Activity Report - XCF Usage by Member - MVSB (6)

```
                                        X C F  A C T I V I T Y
                                                                                                    PAGE    8
        OS/390            SYSTEM ID MVSB          DATE 04/08/1998          INTERVAL 10.00.000
        REL. 01.03.00     RPT VERSION 1.3.0       TIME 09.00.00            CYCLE 1.000 SECONDS


                                        XCF USAGE BY MEMBER
-----------------------------------------------------------------------------------------------------------------------------------

          MEMBERS COMMUNICATING WITH MVSB                                           MEMBERS ON MVSB
-----------------------------------------------------------------      -----------------------------------------------------

                                              REQ          REQ
                                             FROM           TO                                                  REQ        REQ
GROUP       MEMBER              SYSTEM       MVSB         MVSB         GROUP       MEMBER                       OUT         IN

SYSATB01    M51                 MVSA            0            0
            M52                 MVSA            0            0
                                       ----------   ----------
TOTAL                                           0            0

SYSATB02    M38                 MVSC            0            0
            M39                 MVSC            0            0
                                       ----------   ----------
TOTAL                                           0            0

                                                                       SYSATB03    M49                            0          0
                                                                                   M50                            0          0
                                                                                   M54                            0          0
                                                                                   M55                            0          0
                                                                                                         ---------- ----------
                                                                       TOTAL                                      0          0

SYSDAE      MVSA                MVSA            0            0         SYSDAE      MVSB                           0          0
            MVSC                MVSC            0            0                                           ---------- ----------
                                       ----------   ----------         TOTAL                                      0          0
TOTAL                                           0            0

SYSENF      MVSA                MVSA            0            0         SYSENF      MVSB                           0          0
            MVSC                MVSC            0            0                                           ---------- ----------
                                       ----------   ----------         TOTAL                                      0          0
TOTAL                                           0            0

SYSGRS      MVSA                MVSA       96,291       96,291         SYSGRS      MVSB                     192,582    192,582
            MVSC                MVSC       96,291       96,291                                           ---------- ----------
                                       ----------   ----------         TOTAL                                192,582    192,582
TOTAL                                     192,582      192,582

SYSIGW00    IGWCLM01MVSA        MVSA            2            2         SYSIGW00    IGWCLM01MVSB                   4          4
            IGWCLM01MVSC        MVSC            2            2                                           ---------- ----------
                                       ----------   ----------         TOTAL                                      4          4
TOTAL                                           4            4

SYSIGW01    IGWCLM01MVSA        MVSA            0            0         SYSIGW01    IGWCLM01MVSB                   0          0
            IGWCLM01MVSC        MVSC            0            0                                           ---------- ----------
                                       ----------   ----------         TOTAL                                      0          0
TOTAL                                           0            0
```

Figure 29. RMF XCF Activity Report - XCF Usage by Member - MVSB (7)

```
                                              X C F   A C T I V I T Y
                                                                                                        PAGE    9
          OS/390                 SYSTEM ID MVSB            DATE 04/08/1998            INTERVAL 10.00.000
          REL. 01.03.00          RPT VERSION 1.3.0         TIME 09.00.00              CYCLE 1.000 SECONDS


                                              XCF USAGE BY MEMBER
-----------------------------------------------------------------------------------------------------------------------------------

             MEMBERS COMMUNICATING WITH MVSB                                                  MEMBERS ON MVSB
-----------------------------------------------------------------            -----------------------------------------------------

                                                REQ          REQ
                                               FROM           TO                                                    REQ        REQ
GROUP       MEMBER              SYSTEM         MVSB         MVSB            GROUP       MEMBER                      OUT         IN

SYSIKJBC    MVSA                MVSA              0            0            SYSIKJBC    MVSB                          0          0
            MVSC                MVSC              0            0                                             ---------- ----------
                                         ----------   ----------            TOTAL                                     0          0
TOTAL                                             0            0

SYSJES      MVSA                MVSA              0            0            SYSJES      MVSB                          0          0
            MVSC                MVSC              0            0                                             ---------- ----------
                                         ----------   ----------            TOTAL                                     0          0
TOTAL                                             0            0

SYSMCS      MVSA                MVSA             93           42            SYSMCS      MVSB                        181         50
            MVSC                MVSC             88            8                                             ---------- ----------
                                         ----------   ----------            TOTAL                                   181         50
TOTAL                                           181           50

SYSMCS2     MVSA                MVSA              0            0            SYSMCS2     MVSB                          0          0
            MVSC                MVSC              0            0                                             ----------   --------
                                         ----------   ----------            TOTAL                                     0          0
TOTAL                                             0            0

SYSRMF      SYSRMF@@MVSA        MVSA              0            0            SYSRMF      SYSRMF@@MVSB                  0          0
            SYSRMF@@MVSC        MVSC              0            0                                             ---------- ----------
                                         ----------   ----------            TOTAL                                     0          0
TOTAL                                             0            0

SYSWLM      MVSA                MVSA            113          112            SYSWLM      MVSB                        226        225
            MVSC                MVSC            113          113                                             ---------- ----------
                                         ----------   ----------            TOTAL                                   226        225
TOTAL                                           226          225
```

Figure 30. RMF XCF Activity Report - XCF Usage by Member - MVSB (8)

```
                                              X C F   A C T I V I T Y
                                                                                                        PAGE   10
          OS/390                 SYSTEM ID MVSB            DATE 04/08/1998            INTERVAL 10.00.000
          REL. 01.03.00          RPT VERSION 1.3.0         TIME 09.00.00              CYCLE 1.000 SECONDS


TOTAL SAMPLES = 596                            XCF PATH STATISTICS
-----------------------------------------------------------------------------------------------------------------------------------

                             OUTBOUND FROM MVSB                                                       INBOUND TO MVSB
---------------------------------------------------------------------------------         ----------------------------------------
         T FROM/TO                                                                                 T FROM/TO
 TO      Y DEVICE, OR      TRANSPORT       REQ     AVG Q                                  FROM     Y DEVICE, OR         REQ BUFFERS
 SYSTEM  P STRUCTURE       CLASS           OUT     LNGTH    AVAIL     BUSY    RETRY       SYSTEM   P STRUCTURE           IN UNAVAIL


 MVSA    C 05D0 TO 05C0    DEFAULT      43,764      0.03   43,762        2        0       MVSA     C 05C1 TO 05D1    50,851       0
         C 05D8 TO 05C8    DEFAULT      54,862      0.03   54,861        1        0                C 05C9 TO 05D9    48,810       0
 MVSC    C 05DD TO 05ED    DEFAULT      38,663      0.02   38,632       31        0       MVSC     C 05EC TO 05DC    49,043       0
         C 05D5 TO 05E5    DEFAULT      62,260      0.04   62,208       52        0                C 05E4 TO 05D4    53,527       0
                                    ----------                                                                   ----------
 TOTAL                                 199,549                                            TOTAL                     202,231
```

Figure 31. RMF XCF Activity Report - XCF Path Statistics - MVSB

B.1.2 RMF CF Activity Reports

```
                               C O U P L I N G   F A C I L I T Y   A C T I V I T Y
                                                                                                        PAGE   1
     OS/390                 SYSPLEX DDBPLEXE            DATE 04/08/1998          INTERVAL 010.00.000
     REL. 01.03.00           RPT VERSION 1.3.0           TIME 09.00.00            CYCLE 01.000 SECONDS

--------------------------------------------------------------------------------------------------------------------------------
 COUPLING FACILITY NAME = CF01E
 TOTAL SAMPLES(AVG) =   595  (MAX) =   596  (MIN) =   594
--------------------------------------------------------------------------------------------------------------------------------
                                        COUPLING  FACILITY  USAGE  SUMMARY
--------------------------------------------------------------------------------------------------------------------------------
 STRUCTURE SUMMARY
--------------------------------------------------------------------------------------------------------------------------------

                                                   % OF                 % OF       AVG     LST/DIR  DATA      LOCK     DIR
        STRUCTURE                         ALLOC    CF            #      ALL        REQ/    ENTRIES  ELEMENTS  ENTRIES  RECLAIMS
 TYPE   NAME              STATUS CHG      SIZE     STORAGE     REQ      REQ        SEC     TOT/CUR  TOT/CUR   TOT/CUR

 LIST   DSNGED0_SCA       ACTIVE           31M        1.6%    2394      0.4%      3.99       47K       95K      N/A       N/A
                                                                                             179       298      N/A
        DSNGER0_SCA       ACTIVE           31M        1.6%    2384      0.4%      3.97       47K       95K      N/A       N/A
                                                                                             161       235      N/A
        DSNGES0_SCA       ACTIVE           31M        1.6%    2550      0.4%      4.25       47K       95K      N/A       N/A
                                                                                             310       511      N/A

 LOCK   DSNGED0_LOCK1     ACTIVE           16M        0.8%    2564      0.4%      4.27       54K         0     4194K      N/A
                                                                                            2248         0       16K
      K DSNGEP0_LOCK1     ACTIVE          125M        6.3%  394616     64.7%    657.69      374K         0       34M      N/A
                                                                                            7741         0      182K
        DSNGER0_LOCK1     ACTIVE           16M        0.8%    2455      0.4%      4.09       54K         0     4194K      N/A
                                                                                              29         0       42
        DSNGES0_LOCK1     ACTIVE           16M        0.8%   25776      4.2%     42.96       54K         0     4194K      N/A
                                                                                            3030         0       99K

 CACHE  DSNGED0_GBP0      ACTIVE           39M        2.0%     322      0.1%      0.54       22K      8794      N/A         0
                                                                                              52        50      N/A
        DSNGEP0_GBP4      ACTIVE          313M       15.7%  150823     24.7%    251.37      319K       64K      N/A         0
                                                                                            168K       57K      N/A
        DSNGER0_GBP0      ACTIVE            8M        0.4%     270      0.0%      0.45      7066      1409      N/A         0
                                                                                               1         1      N/A
        DSNGES0_GBP0      ACTIVE           31M        1.6%   24399      4.0%     40.66       31K      6231      N/A         0
                                                                                            4195      2649      N/A
        DSNGES0_GBP1      ACTIVE            8M        0.4%     202      0.0%      0.34      7066      1409      N/A         0
                                                                                               0         0      N/A
        DSNGES0_GBP2      ACTIVE            8M        0.4%     224      0.0%      0.37      7066      1409      N/A         0
                                                                                               0         0      N/A
        DSNGES0_GBP4      ACTIVE            4M        0.2%     336      0.1%      0.56      2907       580      N/A         0
                                                                                              24         4      N/A
        DSNGES0_GBP5      ACTIVE            4M        0.2%     368      0.1%      0.61      2907       580      N/A         0
                                                                                               6         4      N/A
        DSNGES0_GBP7      ACTIVE            4M        0.2%     202      0.0%      0.34      2907       580      N/A         0
                                                                                               0         0      N/A

                                        -------      -----  -------    ------   -------
            STRUCTURE TOTALS               685M       34.4%  609885      100%    1016.5
```

Figure 32. RMF CF Activity Report - CF Usage Summary - Structure Summary

For more information on **K**, refer to page 24

```
                              C O U P L I N G   F A C I L I T Y   A C T I V I T Y
                                                                                                      PAGE   2
   OS/390               SYSPLEX DDBPLEXE          DATE 04/08/1998          INTERVAL 010.00.000
   REL. 01.03.00         RPT VERSION 1.3.0          TIME 09.00.00           CYCLE 01.000 SECONDS

------------------------------------------------------------------------------------------------------------------------------
COUPLING FACILITY NAME = CF01E
TOTAL SAMPLES(AVG) =   595  (MAX) =   596  (MIN) =   594
------------------------------------------------------------------------------------------------------------------------------
                                            COUPLING  FACILITY  USAGE  SUMMARY
------------------------------------------------------------------------------------------------------------------------------
STORAGE SUMMARY
------------------------------------------------------------------------------------------------------------------------------

                                           ALLOC     % OF CF     ------- DUMP SPACE -------
                                           SIZE      STORAGE     % IN USE   MAX % REQUESTED

TOTAL CF STORAGE USED BY STRUCTURES         685M      34.4%
TOTAL CF DUMP STORAGE                        49M       2.5%        0.0%             0.0%
TOTAL CF STORAGE AVAILABLE                    1G      63.1%
                                          -------
TOTAL CF STORAGE SIZE                         2G


                                           ALLOC     % ALLOCATED
                                           SIZE

TOTAL CONTROL STORAGE DEFINED                 2G      36.9%
TOTAL DATA STORAGE DEFINED                    0K       0.0%

PROCESSOR SUMMARY
------------------------------------------------------------------------------------------------------------------------------

AVERAGE CF UTILIZATION  (% BUSY)            4.8      LOGICAL PROCESSORS:   DEFINED   2    EFFECTIVE   2.0
```

Figure 33. RMF CF Activity Report - CF Usage Summary - Storage Summary

```
                                     C O U P L I N G   F A C I L I T Y   A C T I V I T Y
                                                                                                                    PAGE   5
          OS/390                  SYSPLEX DDBPLEXE            DATE 04/08/1998          INTERVAL 010.00.000
          REL. 01.03.00            RPT VERSION 1.3.0           TIME 09.00.00            CYCLE 01.000 SECONDS

     ------------------------------------------------------------------------------------------------------------------------------
      COUPLING FACILITY NAME = CF01E
     ------------------------------------------------------------------------------------------------------------------------------
                                                COUPLING  FACILITY  STRUCTURE  ACTIVITY
     ------------------------------------------------------------------------------------------------------------------------------

                                                                                                                  -FALSE CONT      5

      STRUCTURE NAME = DSNGEP0_LOCK1     TYPE = LOCK
                # REQ     -------------- REQUESTS -------------   -------------- DELAYED REQUESTS -------------
      SYSTEM    TOTAL              #     % OF  -SERV TIME(MIC)-    REASON    #    % OF  ---- AVG TIME(MIC) -----   EXTERNAL REQUEST
      NAME      AVG/SEC           REQ     ALL     AVG   STD_DEV             REQ    REQ   /DEL     STD_DEV   /ALL   CONTENTIONS

      MVSA        235K   SYNC    235K  59.6% A 99.8      34.4                                                   I  REQ TOTAL      287K
                392.2    ASYNC      0   0.0%    0.0       0.0    NO SCH    0   0.0%    0.0        0.0    0.0   REQ DEFERRED  6249
                         CHNGD      0   0.0%  INCLUDED IN ASYNC                                              J  -CONT         6249
                                                                                                              -FALSE CONT   4454

      MVSB          0    SYNC       0   0.0%    0.0       0.0                                                  REQ TOTAL        0
                 0.00    ASYNC      0   0.0%    0.0       0.0    NO SCH    0   0.0%    0.0        0.0    0.0   REQ DEFERRED     0
                         CHNGD      0   0.0%  INCLUDED IN ASYNC                                                -CONT            0
                                                                                                              -FALSE CONT      0

      MVSC        159K   SYNC    159K  40.4% B 89.9      30.5                                                  REQ TOTAL      219K
                265.5    ASYNC      0   0.0%    0.0       0.0    NO SCH    0   0.0%    0.0        0.0    0.0   REQ DEFERRED  6677
                         CHNGD      0   0.0%  INCLUDED IN ASYNC                                                -CONT         6677
                                                                                                              -FALSE CONT   4891

     ------------------------------------------------------------------------------------------------------------------------------
      TOTAL       395K   SYNC    395K   100%   95.8      33.2                                                  REQ TOTAL      506K
                657.7    ASYNC      0   0.0%    0.0       0.0    NO SCH    0   0.0%    0.0        0.0    0.0   REQ DEFERRED    13K
                         CHNGD      0   0.0%                                                                   -CONT           13K
                                                                                                              -FALSE CONT   9345
```

Figure 34. RMF CF Activity Report - CF Structure Activity - CF01E (1)

For more information on **A**, refer to page 19
For more information on **B**, refer to page 19
For more information on **I**, refer to page 24
For more information on **J**, refer to page 24

```
                                   C O U P L I N G   F A C I L I T Y   A C T I V I T Y
                                                                                                                      PAGE   8
        OS/390                 SYSPLEX DDBPLEXE            DATE 04/08/1998           INTERVAL 010.00.000
        REL. 01.03.00           RPT VERSION 1.3.0           TIME 09.00.00             CYCLE 01.000 SECONDS

 ------------------------------------------------------------------------------------------------------------------------------
  COUPLING FACILITY NAME = CF01E
 ------------------------------------------------------------------------------------------------------------------------------
                                           COUPLING  FACILITY  STRUCTURE  ACTIVITY
 ------------------------------------------------------------------------------------------------------------------------------

  STRUCTURE NAME = DSNGEPO_GBP4      TYPE = CACHE
            # REQ    -------------- REQUESTS -------------   -------------- DELAYED REQUESTS -------------
  SYSTEM    TOTAL              #    % OF  -SERV TIME(MIC)-    REASON    #    % OF  ---- AVG TIME(MIC) -----
  NAME      AVG/SEC           REQ    ALL     AVG   STD_DEV             REQ    REQ   /DEL     STD_DEV   /ALL
                   B3
  MVSA      77729    SYNC      73K  48.3%   129.9      61.1
            129.5    ASYNC  2110    1. C 1572. B4 3050.3    NO SCH 3297  66.8%   1166      690.9  779.4
                     CHNGD  2823    1.9%  INCLUDED IN ASYNC
                                                            DUMP      0  0.0%    0.0        0.0

  MVSB          0    SYNC      0    0.0%     0.0       0.0
             0.00    ASYNC     0    0.0%     0.0       0.0    NO SCH    0  0.0%    0.0        0.0    0.0
                     CHNGD     0    0.0%  INCLUDED IN ASYNC
                                                            DUMP      0  0.0%    0.0        0.0

  MVSC      73094    SYNC      69K  45.7%   129.2      58.8
            121.8    ASYNC  2344    1.6 D 800.1    1672.4    NO SCH 2072  49.9%  592.2      825.6  295.5
                     CHNGD  1808    1.2%  INCLUDED IN ASYNC
                                                            DUMP      0  0.0%    0.0        0.0

 ------------------------------------------------------------------------------------------------------------------------------
  TOTAL      151K    SYNC     142K  94.0%   129.6      60.0                                                 -- DATA ACCESS ---
            251.4    ASYNC  4454    3.0%  1219.3    2545.1    NO SCH 5369  59.1%  944.7      796.3  558.3  READS         9346
                     CHNGD  4631    3.1%                                                                WRITES       51052
                                                            DUMP      0  0.0%    0.0        0.0    0.0  CASTOUTS      9167
                                                                                                        XI'S          6282
```

Figure 35. RMF CF Activity Report - CF Structure Activity - CF01E (2)

For more information on **B3**, refer to page 20
For more information on **B4**, refer to page 20
For more information on **C**, refer to page 20
For more information on **D**, refer to page 20

```
                                   C O U P L I N G   F A C I L I T Y   A C T I V I T Y
                                                                                                                      PAGE  14
        OS/390                 SYSPLEX DDBPLEXE            DATE 04/08/1998           INTERVAL 010.00.000
        REL. 01.03.00           RPT VERSION 1.3.0           TIME 09.00.00             CYCLE 01.000 SECONDS

 ------------------------------------------------------------------------------------------------------------------------------
  COUPLING FACILITY NAME = CF01E
 ------------------------------------------------------------------------------------------------------------------------------
                                                   SUBCHANNEL  ACTIVITY
 ------------------------------------------------------------------------------------------------------------------------------
           # REQ                                ----------- REQUESTS -----------   -------------- DELAYED REQUESTS --------------
  SYSTEM   TOTAL                --BUSY--                #   -SERVICE TIME(MIC)-          #     % OF   ------ AVG TIME(MIC) ------
  NAME     AVG/SEC -- CONFIG --  -COUNTS-              REQ     AVG    STD_DEV           REQ     REQ    /DEL    STD_DEV      /ALL

  MVSA      321378 SCH GEN    4  PTH    0    SYNC    308141   106.9      44.1   SYNC    16   0.0%   95.4      79.7       0.0
             535.6 SCH USE    4  SCH   16    ASYNC     2110  1572.1      3050   ASYNC 3297  66.8%   1166     690.9     779.4
                   SCH MAX    4              CHANGED   2823  INCLUDED IN ASYNC  TOTAL 3313   1.1%
                   PTH        2              UNSUCC       0     0.0       0.0
  MVSB       28118 SCH GEN    2  PTH    0    SYNC     19213   244.9      95.0   SYNC     4   0.0%  204.3      96.6       0.0
              46.9 SCH USE    2  SCH    4    ASYNC      477  3586.6      4414   ASYNC    7   1.5%  126.6      69.8       1.9
                   SCH MAX    2              CHANGED      1  INCLUDED IN ASYNC  TOTAL   11   0.1%
                   PTH        1              UNSUCC       0     0.0       0.0
  MVSC      285756 SCH GEN    4  PTH    0    SYNC    272736   100.7      44.5   SYNC    80   0.0%  106.7      95.8       0.0
             476.3 SCH USE    4  SCH   80    ASYNC     2573  1166.1      2461   ASYNC 2075  47.3%  591.5     825.2     280.0
                   SCH MAX    4              CHANGED   1811  INCLUDED IN ASYNC  TOTAL 2155   0.8%
                   PTH        2              UNSUCC       0     0.0       0.0
```

Figure 36. RMF CF Activity Report - Subchannel Activity - CF01E

```
                              C O U P L I N G   F A C I L I T Y   A C T I V I T Y
                                                                                                     PAGE   1
    OS/390               SYSPLEX DDBPLEXE          DATE 04/08/1998          INTERVAL 010.00.000
    REL. 01.03.00         RPT VERSION 1.3.0         TIME 09.00.00             CYCLE 01.000 SECONDS

-----------------------------------------------------------------------------------------------------------------------------
 COUPLING FACILITY NAME = CF02E
 TOTAL SAMPLES(AVG) =   595  (MAX) =   596  (MIN) =   594
-----------------------------------------------------------------------------------------------------------------------------
                                          COUPLING  FACILITY  USAGE  SUMMARY
-----------------------------------------------------------------------------------------------------------------------------
 STRUCTURE SUMMARY
-----------------------------------------------------------------------------------------------------------------------------
                                                                                              G
                                                      % OF                % OF      AVG     LST/DIR  DATA      LOCK     DIR
        STRUCTURE                         ALLOC       CF           #      ALL       REQ/    ENTRIES  ELEMENTS  ENTRIES  RECLAIMS
 TYPE   NAME              STATUS CHG      SIZE        STORAGE     REQ     REQ       SEC     TOT/CUR  TOT/CUR   TOT/CUR

 LIST   DSNGEP0_SCA       ACTIVE           64M          3.2%      345     0.1%      0.57      83K      166K      N/A       N/A
                                                                                           169       318       N/A
        DSNGET0_SCA       ACTIVE           31M          1.6%     2454     0.5%      4.09      47K       95K      N/A       N/A
                                                                                           219       355       N/A

 LIST   ISTGENERIC        ACTIVE            5M          0.3%    12534     2.5%     20.89      22K       444        4       N/A
                                                                                            79        13        0

 LOCK   DSNGET0_LOCK1     ACTIVE           16M          0.8%    10033     2.0%     16.72      54K         0     4194K      N/A
                                                                                           328         0       39K

 CACHE  DSNGEP0_GBP0      ACTIVE           63M          3.1%     4655     0.9%      7.76      63K       13K      N/A         0
                                                                                            28K       11K      N/A
        DSNGEP0_GBP1      ACTIVE          500M         25.1%   130239    25.9%    217.06     232K      116K      N/A         0
                                                                                           149K      102K      N/A
        DSNGEP0_GBP2      ACTIVE           63M          3.1%    83255    16.5%    138.76      73K       12K      N/A         0
                                                                                            22K      7364      N/A
        DSNGEP0_GBP32K1   ACTIVE            6M          0.3%      439     0.1%      0.73     902      1424      N/A         0
                                                                                           316      1392      N/A
        DSNGEP0_GBP5      ACTIVE          125M          6.3%   249364    49.5%    415.61      83K       28K      N/A         0
                                                                                            39K       28K      N/A
        DSNGEP0_GBP7      ACTIVE           16M          0.8%       63     0.0%      0.10      16K      3211      N/A         0
                                                                                             0         0       N/A
        DSNGET0_GBP0      ACTIVE           20M          1.0%     9165     1.8%     15.27      19K      3846      N/A         0
                                                                                          2785      2686       N/A
        DSNGET0_GBP1      ACTIVE            8M          0.4%      220     0.0%      0.37    7066      1409       N/A         0
                                                                                             0         0       N/A
        DSNGET0_GBP32K1   ACTIVE            4M          0.2%      183     0.0%      0.30     518       823       N/A         0
                                                                                             0         0       N/A
        DSNGET0_GBP4      ACTIVE            4M          0.2%      229     0.0%      0.38    2907       580       N/A         0
                                                                                             1         1       N/A
        DSNGET0_GBP5      ACTIVE            4M          0.2%      202     0.0%      0.34    2907       580       N/A         0
                                                                                             0         0       N/A

                                        -------      -----  -------   ------   -------
            STRUCTURE TOTALS               927M        46.6%   503380     100%    838.97
```

Figure 37. RMF CF Activity Report - CF Usage Summary - CF02E

For more information on **G**, refer to page 23

```
                                     C O U P L I N G   F A C I L I T Y   A C T I V I T Y
                                                                                                                          PAGE   2
    OS/390                   SYSPLEX DDBPLEXE            DATE 04/08/1998           INTERVAL 010.00.000
    REL. 01.03.00             RPT VERSION 1.3.0            TIME 09.00.00              CYCLE 01.000 SECONDS

------------------------------------------------------------------------------------------------------------------------------
 COUPLING FACILITY NAME = CF02E
 TOTAL SAMPLES(AVG) =   595  (MAX) =   596  (MIN) =   594
------------------------------------------------------------------------------------------------------------------------------
                                             COUPLING  FACILITY  USAGE  SUMMARY
------------------------------------------------------------------------------------------------------------------------------
 STORAGE SUMMARY
------------------------------------------------------------------------------------------------------------------------------

                                            ALLOC     % OF CF     ------- DUMP SPACE -------
                                            SIZE      STORAGE     % IN USE   MAX % REQUESTED

 TOTAL CF STORAGE USED BY STRUCTURES         927M      46.6%
 TOTAL CF DUMP STORAGE                        49M       2.5%         0.0%              0.0%
 TOTAL CF STORAGE AVAILABLE                    1G      50.9%
                                           -------
 TOTAL CF STORAGE SIZE                         2G


                                            ALLOC     % ALLOCATED
                                            SIZE

 TOTAL CONTROL STORAGE DEFINED                 2G      49.1%
 TOTAL DATA STORAGE DEFINED                    0K       0.0%

 PROCESSOR SUMMARY
------------------------------------------------------------------------------------------------------------------------------

 AVERAGE CF UTILIZATION  (% BUSY)           5.4      LOGICAL PROCESSORS:   DEFINED   2    EFFECTIVE   2.0
```

Figure 38. RMF CF Activity Report - CF Structure Activity - CF02E (1)

```
                                     C O U P L I N G   F A C I L I T Y   A C T I V I T Y
                                                                                                                         PAGE   3
          OS/390                   SYSPLEX DDBPLEXE            DATE 04/08/1998           INTERVAL 010.00.000
          REL. 01.03.00             RPT VERSION 1.3.0           TIME 09.00.00             CYCLE 01.000 SECONDS

     ------------------------------------------------------------------------------------------------------------------------------
      COUPLING FACILITY NAME = CF02E
     ------------------------------------------------------------------------------------------------------------------------------
                                                  COUPLING  FACILITY  STRUCTURE  ACTIVITY
     ------------------------------------------------------------------------------------------------------------------------------

      STRUCTURE NAME = DSNGEP0_SCA       TYPE = LIST
                # REQ    -------------- REQUESTS -------------   -------------- DELAYED REQUESTS -------------
      SYSTEM    TOTAL             #     % OF  -SERV TIME(MIC)-    REASON    #    % OF  ---- AVG TIME(MIC) -----
      NAME      AVG/SEC          REQ    ALL     AVG   STD_DEV             REQ    REQ   /DEL    STD_DEV   /ALL

      MVSA        186    SYNC    185   53.6%   204.6     63.7
                 0.31    ASYNC     0    0.0%   638.0      0.0    NO SCH    1   100%   19.0       0.0   19.0
                         CHNGD     1    0.3%  INCLUDED IN ASYNC
                                                                  DUMP      0   0.0%    0.0       0.0

      MVSB          0    SYNC      0    0.0%     0.0      0.0
                 0.00    ASYNC     0    0.0%     0.0      0.0    NO SCH    0   0.0%    0.0       0.0    0.0
                         CHNGD     0    0.0%  INCLUDED IN ASYNC
                                                                  DUMP      0   0.0%    0.0       0.0

      MVSC        159    SYNC    159   46.1%   195.3     38.8
                 0.26    ASYNC     0    0.0%     0.0      0.0    NO SCH    0   0.0%    0.0       0.0    0.0
                         CHNGD     0    0.0%  INCLUDED IN ASYNC
                                                                  DUMP      0   0.0%    0.0       0.0

     ------------------------------------------------------------------------------------------------------------------------------
      TOTAL       345    SYNC    344    100%   200.3     53.8
                 0.57    ASYNC     0    0.0%   638.0      0.0    NO SCH    1   100%   19.0       0.0   19.0
                         CHNGD     1    0.3%
                                                                  DUMP      0   0.0%    0.0       0.0    0.0



      STRUCTURE NAME = ISTGENERIC        TYPE = LIST
                # REQ    -------------- REQUESTS -------------   -------------- DELAYED REQUESTS -------------
      SYSTEM    TOTAL             #     % OF  -SERV TIME(MIC)-    REASON    #    % OF  ---- AVG TIME(MIC) -----  EXTERNAL REQUEST
      NAME      AVG/SEC          REQ    ALL     AVG   STD_DEV             REQ    REQ   /DEL    STD_DEV   /ALL   CONTENTIONS

      MVSA       6550    SYNC   6538   52.2%   126.9     16.0                                                   REQ TOTAL     6550
                10.92    ASYNC     0    0.0%   311.8     80.8    NO SCH   12   100%  938.4     659.2  938.4   REQ DEFERRED     0
                         CHNGD    12    0.1%  INCLUDED IN ASYNC
                                                                  DUMP      0   0.0%    0.0       0.0

      MVSB       2242    SYNC   2242   17.9%   221.2     47.0                                                   REQ TOTAL     2242
                 3.74    ASYNC     0    0.0%     0.0      0.0    NO SCH    0   0.0%    0.0       0.0    0.0   REQ DEFERRED     0
                         CHNGD     0    0.0%  INCLUDED IN ASYNC
                                                                  DUMP      0   0.0%    0.0       0.0

      MVSC       3742    SYNC   3742   29.9%   118.6     14.2                                                   REQ TOTAL     3742
                 6.24    ASYNC     0    0.0%     0.0      0.0    NO SCH    0   0.0%    0.0       0.0    0.0   REQ DEFERRED     0
                         CHNGD     0    0.0%  INCLUDED IN ASYNC
                                                                  DUMP      0   0.0%    0.0       0.0

     ------------------------------------------------------------------------------------------------------------------------------
      TOTAL     12534    SYNC    13K    100%   141.3     44.6                                                   REQ TOTAL      13K
                20.89    ASYNC     0    0.0%   311.8     80.8    NO SCH   12   100%  938.4     659.2  938.4   REQ DEFERRED     0
                         CHNGD    12    0.1%
                                                                  DUMP      0   0.0%    0.0       0.0    0.0
```

Figure 39. RMF CF Activity Report - CF Structure Activity - CF02E (2)

```
                                        C O U P L I N G   F A C I L I T Y   A C T I V I T Y
                                                                                                                     PAGE   5
    OS/390                  SYSPLEX DDBPLEXE           DATE 04/08/1998           INTERVAL 010.00.000
    REL. 01.03.00            RPT VERSION 1.3.0          TIME 09.00.00             CYCLE 01.000 SECONDS

-------------------------------------------------------------------------------------------------------------------------------
 COUPLING FACILITY NAME = CF02E
-------------------------------------------------------------------------------------------------------------------------------
                                              COUPLING  FACILITY  STRUCTURE  ACTIVITY
-------------------------------------------------------------------------------------------------------------------------------

 STRUCTURE NAME = DSNGEP0_GBP0      TYPE = CACHE
           # REQ    -------------- REQUESTS -------------   -------------- DELAYED REQUESTS -------------
 SYSTEM    TOTAL             #     % OF  -SERV TIME(MIC)-    REASON    #    % OF  ---- AVG TIME(MIC) -----
 NAME      AVG/SEC          REQ    ALL     AVG   STD_DEV             REQ    REQ   /DEL    STD_DEV   /ALL

 MVSA        4082   SYNC   3924   84.3%   128.2     61.2
             6.80   ASYNC   157    3.4%  4658.5   4902.6    NO SCH    1   0.6%   69.0        0.0    0.4
                    CHNGD     1    0.0%  INCLUDED IN ASYNC
                                                            DUMP      0   0.0%    0.0        0.0

 MVSB           0   SYNC      0    0.0%     0.0      0.0
             0.00   ASYNC     0    0.0%     0.0      0.0    NO SCH    0   0.0%    0.0        0.0    0.0
                    CHNGD     0    0.0%  INCLUDED IN ASYNC
                                                            DUMP      0   0.0%    0.0        0.0

 MVSC         573   SYNC    541   11.6%   117.5     48.6
             0.95   ASYNC    32    0.7%   10302   2201.4    NO SCH    0   0.0%    0.0        0.0    0.0
                    CHNGD     0    0.0%  INCLUDED IN ASYNC
                                                            DUMP      0   0.0%    0.0        0.0

-------------------------------------------------------------------------------------------------------------------------------
 TOTAL       4655   SYNC   4465   95.9%   126.9     59.9                                                   -- DATA ACCESS ---
             7.76   ASYNC   189    4.1%  5609.0   5024.5    NO SCH    1   0.5%   69.0        0.0    0.4    READS          216
                    CHNGD     1    0.0%                                                                    WRITES        1349
                                                            DUMP      0   0.0%    0.0        0.0    0.0    CASTOUTS       307
                                                                                                           XI'S          4484

 STRUCTURE NAME = DSNGEP0_GBP1      TYPE = CACHE
           # REQ    -------------- REQUESTS -------------   -------------- DELAYED REQUESTS -------------
 SYSTEM    TOTAL             #     % OF  -SERV TIME(MIC)-    REASON    #    % OF  ---- AVG TIME(MIC) -----
 NAME      AVG/SEC          REQ    ALL     AVG   STD_DEV             REQ    REQ   /DEL    STD_DEV   /ALL

 MVSA      91620    SYNC    86K   65.8%   160.5     64.7
           152.7    ASYNC  2725    2.1%   455.3    207.1    NO SCH 3662  61.7%  940.7       1174  580.6
                    CHNGD  3208    2.5%  INCLUDED IN ASYNC
                                                            DUMP      0   0.0%    0.0        0.0

 MVSB           0   SYNC      0    0.0%     0.0      0.0
             0.00   ASYNC     0    0.0%     0.0      0.0    NO SCH    0   0.0%    0.0        0.0    0.0
                    CHNGD     0    0.0%  INCLUDED IN ASYNC
                                                            DUMP      0   0.0%    0.0        0.0

 MVSC      38619    SYNC    38K   29.1%   143.7     56.6
           64.36    ASYNC   667    0.5%  2032.8   2754.0    NO SCH    3   0.4%  187.3      163.5    0.8
                    CHNGD     3    0.0%  INCLUDED IN ASYNC
                                                            DUMP      0   0.0%    0.0        0.0

-------------------------------------------------------------------------------------------------------------------------------
 TOTAL        130K  SYNC   124K   94.9%   155.3     62.8                                                   -- DATA ACCESS ---
           217.1    ASYNC  3392    2.6%   615.3   1016.9    NO SCH 3665  55.5%  940.1       1173  521.8    READS        12560
                    CHNGD  3211    2.5%                                                                    WRITES       72097
                                                            DUMP      0   0.0%    0.0        0.0    0.0    CASTOUTS     17669
                                                                                                           XI'S          1977
```

Figure 40. RMF CF Activity Report - CF Structure Activity - CF02E (3)

```
                              C O U P L I N G   F A C I L I T Y   A C T I V I T Y
                                                                                                  PAGE   7
   OS/390                 SYSPLEX DDBPLEXE            DATE 04/08/1998          INTERVAL 010.00.000
   REL. 01.03.00           RPT VERSION 1.3.0           TIME 09.00.00            CYCLE 01.000 SECONDS

-------------------------------------------------------------------------------------------------------------------------------
 COUPLING FACILITY NAME = CF02E
-------------------------------------------------------------------------------------------------------------------------------
                                           COUPLING  FACILITY  STRUCTURE  ACTIVITY
-------------------------------------------------------------------------------------------------------------------------------

 STRUCTURE NAME = DSNGEP0_GBP2      TYPE = CACHE
           # REQ    -------------- REQUESTS -------------   -------------- DELAYED REQUESTS -------------
 SYSTEM    TOTAL             #     % OF  -SERV TIME(MIC)-    REASON    #    % OF  ---- AVG TIME(MIC) -----
 NAME      AVG/SEC          REQ    ALL     AVG   STD_DEV             REQ    REQ   /DEL    STD_DEV   /ALL

 MVSA      73576    SYNC    66K  78.9%   106.3     27.7
           122.6    ASYNC  7757   9.3%   453.1    928.6    NO SCH  174   2.2%  398.8      507.9    8.8
                    CHNGD   157   0.2%  INCLUDED IN ASYNC
                                                           DUMP      0   0.0%    0.0        0.0

 MVSB          0    SYNC      0   0.0%     0.0      0.0
            0.00    ASYNC     0   0.0%     0.0      0.0    NO SCH    0   0.0%    0.0        0.0    0.0
                    CHNGD     0   0.0%  INCLUDED IN ASYNC
                                                           DUMP      0   0.0%    0.0        0.0

 MVSC       9679    SYNC   9418  11.3%   116.8     43.2
           16.13    ASYNC   260   0.3%   531.7    225.3    NO SCH    1   0.4%  728.0        0.0    2.8
                    CHNGD     1   0.0%  INCLUDED IN ASYNC
                                                           DUMP      0   0.0%    0.0        0.0

-------------------------------------------------------------------------------------------------------------------------------
 TOTAL     83255    SYNC    75K  90.2%   107.7     30.3                                                  -- DATA ACCESS ---
           138.8    ASYNC  8017   9.6%   455.6    914.7    NO SCH  175   2.1%  400.7      507.0    8.6    READS         2310
                    CHNGD   158   0.2%                                                                   WRITES        3719
                                                           DUMP      0   0.0%    0.0        0.0    0.0   CASTOUTS      1888
                                                                                                         XI'S           553

 STRUCTURE NAME = DSNGEP0_GBP32K1   TYPE = CACHE
           # REQ    -------------- REQUESTS -------------   -------------- DELAYED REQUESTS -------------
 SYSTEM    TOTAL             #     % OF  -SERV TIME(MIC)-    REASON    #    % OF  ---- AVG TIME(MIC) -----
 NAME      AVG/SEC          REQ    ALL     AVG   STD_DEV             REQ    REQ   /DEL    STD_DEV   /ALL

 MVSA        380    SYNC     63  14.4%   113.5     46.9
            0.63    ASYNC   317  72.2%   991.9    447.0    NO SCH    1   0.3%   1486        0.0    4.7
                    CHNGD     0   0.0%  INCLUDED IN ASYNC
                                                           DUMP      0   0.0%    0.0        0.0

 MVSB          0    SYNC      0   0.0%     0.0      0.0
            0.00    ASYNC     0   0.0%     0.0      0.0    NO SCH    0   0.0%    0.0        0.0    0.0
                    CHNGD     0   0.0%  INCLUDED IN ASYNC
                                                           DUMP      0   0.0%    0.0        0.0

 MVSC         59    SYNC      0   0.0%     0.0      0.0
            0.10    ASYNC    59  13.4%   923.0    324.8    NO SCH    0   0.0%    0.0        0.0    0.0
                    CHNGD     0   0.0%  INCLUDED IN ASYNC
                                                           DUMP      0   0.0%    0.0        0.0

-------------------------------------------------------------------------------------------------------------------------------
 TOTAL       439    SYNC     63  14.4%   113.5     46.9                                                  -- DATA ACCESS ---
            0.73    ASYNC   376  85.6%   981.1    430.5    NO SCH    1   0.3%   1486        0.0    4.0   READS           40
                    CHNGD     0   0.0%                                                                   WRITES         296
                                                           DUMP      0   0.0%    0.0        0.0    0.0   CASTOUTS        22
                                                                                                         XI'S            40

                                                                                                         XI'S          1801
```

Figure 41. RMF CF Activity Report - CF Structure Activity - CF02E (4)

```
                               C O U P L I N G   F A C I L I T Y   A C T I V I T Y
                                                                                                               PAGE   8
    OS/390                 SYSPLEX DDBPLEXE            DATE 04/08/1998           INTERVAL 010.00.000
    REL. 01.03.00           RPT VERSION 1.3.0           TIME 09.00.00             CYCLE 01.000 SECONDS

------------------------------------------------------------------------------------------------------------------------------
 COUPLING FACILITY NAME = CF02E
------------------------------------------------------------------------------------------------------------------------------
                                          COUPLING  FACILITY  STRUCTURE  ACTIVITY
------------------------------------------------------------------------------------------------------------------------------

                                                                                                      XI'S          40

 STRUCTURE NAME = DSNGEP0_GBP5      TYPE = CACHE
           # REQ    -------------- REQUESTS -------------   -------------- DELAYED REQUESTS -------------
 SYSTEM    TOTAL              #    % OF  -SERV TIME(MIC)-    REASON    #    % OF  ---- AVG TIME(MIC) -----
 NAME      AVG/SEC           REQ    ALL     AVG   STD_DEV             REQ    REQ   /DEL    STD_DEV   /ALL

 MVSA        169K   SYNC    139K  55.6%   136.0     59.5
           281.0    ASYNC    26K  10.5%   552.9    944.6     NO SCH 4373  14.6%  832.2      677.8  121.6
                    CHNGD  3786    1.5%  INCLUDED IN ASYNC
                                                             DUMP      0   0.0%    0.0        0.0

 MVSB          0    SYNC       0   0.0%     0.0      0.0
            0.00    ASYNC      0   0.0%     0.0      0.0     NO SCH    0   0.0%    0.0        0.0    0.0
                    CHNGD      0   0.0%  INCLUDED IN ASYNC
                                                             DUMP      0   0.0%    0.0        0.0

 MVSC      80782    SYNC     74K  29.8%   120.4     55.7
           134.6    ASYNC  5791    2.3%   602.9    620.7     NO SCH  895  13.7%  474.5      406.1   65.1
                    CHNGD   734    0.3%  INCLUDED IN ASYNC
                                                             DUMP      0   0.0%    0.0        0.0

------------------------------------------------------------------------------------------------------------------------------
 TOTAL       249K   SYNC    213K  85.4%   130.6     58.6                                                 -- DATA ACCESS ---
           415.6    ASYNC    32K  12.8%   561.8    895.5     NO SCH 5268  14.4%  771.4      653.8  111.4   READS       21747
                    CHNGD  4520    1.8%                                                                  WRITES      58500
                                                             DUMP      0   0.0%    0.0        0.0    0.0   CASTOUTS    20312
                                                                                                         XI'S         1801
```

Figure 42. RMF CF Activity Report - CF Structure Activity - CF02E (5)

```
                                   C O U P L I N G   F A C I L I T Y   A C T I V I T Y
                                                                                                             PAGE   9
   OS/390                  SYSPLEX DDBPLEXE           DATE 04/08/1998           INTERVAL 010.00.000
   REL. 01.03.00            RPT VERSION 1.3.0          TIME 09.00.00             CYCLE 01.000 SECONDS

-------------------------------------------------------------------------------------------------------------------------------
 COUPLING FACILITY NAME = CF02E
-------------------------------------------------------------------------------------------------------------------------------
                                           COUPLING  FACILITY  STRUCTURE  ACTIVITY
-------------------------------------------------------------------------------------------------------------------------------

 STRUCTURE NAME = DSNGEP0_GBP7      TYPE = CACHE
           # REQ    -------------- REQUESTS -------------   -------------- DELAYED REQUESTS -------------
 SYSTEM    TOTAL              #     % OF  -SERV TIME(MIC)-    REASON    #    % OF  ---- AVG TIME(MIC) -----
 NAME      AVG/SEC           REQ    ALL     AVG   STD_DEV             REQ    REQ   /DEL    STD_DEV   /ALL

 MVSA         63    SYNC     59   93.7%   108.7     17.8
            0.10    ASYNC     4    6.3%  9418.3   1819.5    NO SCH    0   0.0%    0.0        0.0    0.0
                    CHNGD     0    0.0%  INCLUDED IN ASYNC
                                                            DUMP      0   0.0%    0.0        0.0

 MVSB          0    SYNC      0    0.0%     0.0      0.0
            0.00    ASYNC     0    0.0%     0.0      0.0    NO SCH    0   0.0%    0.0        0.0    0.0
                    CHNGD     0    0.0%  INCLUDED IN ASYNC
                                                            DUMP      0   0.0%    0.0        0.0

 MVSC          0    SYNC      0    0.0%     0.0      0.0
            0.00    ASYNC     0    0.0%     0.0      0.0    NO SCH    0   0.0%    0.0        0.0    0.0
                    CHNGD     0    0.0%  INCLUDED IN ASYNC
                                                            DUMP      0   0.0%    0.0        0.0

-------------------------------------------------------------------------------------------------------------------------------
 TOTAL        63    SYNC     59   93.7%   108.7     17.8                                                  -- DATA ACCESS ---
            0.10    ASYNC     4    6.3%  9418.3   1819.5    NO SCH    0   0.0%    0.0        0.0    0.0   READS            0
                    CHNGD     0    0.0%                                                                   WRITES           0
                                                            DUMP      0   0.0%    0.0        0.0    0.0   CASTOUTS         0
                                                                                                          XI'S             0
```

Figure 43. RMF CF Activity Report - CF Structure Activity - CF02E (6)

```
                                   C O U P L I N G   F A C I L I T Y   A C T I V I T Y
                                                                                                             PAGE  13
   OS/390                  SYSPLEX DDBPLEXE           DATE 04/08/1998           INTERVAL 010.00.000
   REL. 01.03.00            RPT VERSION 1.3.0          TIME 09.00.00             CYCLE 01.000 SECONDS

-------------------------------------------------------------------------------------------------------------------------------
 COUPLING FACILITY NAME = CF02E
-------------------------------------------------------------------------------------------------------------------------------
                                                    SUBCHANNEL  ACTIVITY
-------------------------------------------------------------------------------------------------------------------------------
          # REQ                                     ----------- REQUESTS -----------   -------------- DELAYED REQUESTS --------------
 SYSTEM   TOTAL                --BUSY--                   #    -SERVICE TIME(MIC)-          #     % OF  ------ AVG TIME(MIC) ------
 NAME     AVG/SEC -- CONFIG --  -COUNTS-                 REQ      AVG    STD_DEV           REQ    REQ   /DEL     STD_DEV      /ALL
                           E          F
 MVSA     352738  SCH GEN   4  PTH    0     SYNC    300760   136.2      58.5   SYNC     1   0.0%  109.0        0.0       0.0
           587.9  SCH USE   4  SCH    1     ASYNC    37114   540.5     960.0   ASYNC 8224  18.6%  871.4      933.5     161.8
                  SCH MAX   4               CHANGED   7165  INCLUDED IN ASYNC  TOTAL 8225   2.4%
                  PTH       2               UNSUCC       0     0.0       0.0
 MVSB      28317  SCH GEN   2  PTH    0     SYNC     18110   226.4      87.2   SYNC     6   0.0%  172.7      155.3       0.1
            47.2  SCH USE   2  SCH    6     ASYNC      582  5922.8      5489   ASYNC   19   3.2%  221.8      154.8       7.1
                  SCH MAX   2               CHANGED      9  INCLUDED IN ASYNC  TOTAL   25   0.1%
                  PTH       1               UNSUCC       0     0.0       0.0
 MVSC     149246  SCH GEN   4  PTH    0     SYNC    131996   126.6      55.6   SYNC     0   0.0%    0.0        0.0       0.0
           248.7  SCH USE   4  SCH    0     ASYNC     6906   857.9      1556   ASYNC  899  11.8%  473.8      405.7      55.7
                  SCH MAX   4               CHANGED    738  INCLUDED IN ASYNC  TOTAL  899   0.6%
                  PTH       2               UNSUCC       0     0.0       0.0
```

Figure 44. RMF CF Activity Report - Subchannel Activity - CF02E

For more information on **E**, refer to page 21
For more information on **F**, refer to page 21

B.2 Sample CF Monitor Screens

```
--------------------------------------------------------------------------------
CFLP0000                 CF Monitor - Option Menu          Version    1.1.0
  Select one of the following options:
      1 - Coupling  Facilities
      2 - Defined   Structures
      3 - Allocated Structures
      4 - Connections
--------------------------------------------------------------------------------
      Current time       98.098   09:49      Elapsed    secs    256158
      Monitor start time 98.095   10:37      CPU time   secs    1911
      Monitor cycle time 10   secs           Monitor    status  MASTER
                                             Monitored  systems 4

      Sysplex id         DDBPLEXB            HRDW  name         PROCB1
      SYSID              FCPU                LPAR  name         FCPU
      System             SP6.0.3             CPU model          9672
```

Figure 45. CF Monitor - Option Menu (Brabrand)

```
CFLP0251                   Connections Display
                                                           Num-sys 4
  Interval start 98.095 10:37  End 98.098 10:04:07         SYSID   MASTER
  Interval length   071:24:08  Secs        257048 <- Last cycle 10  secs ->
                Type              Stat Total req <- Sync .Cycle.  Async -> CF
  Structure name   # Connection name  #  163318071  1242           19        LV
- ---------------- - ---------------- - b--m--k--- -Rate  -S/T- -Rate  -S/T- --
_ ISGLOCK      L1  K ISGLOCK#ACPU     A   50299101   113     81     0      0  0
_ ISGLOCK      L2  K ISGLOCK#BCPU     A   20098908    41    101     0      0  0
_ DSNGBP0_GBP1     C DB2_DBPA         A   19739365   111    150     1    379  2
_ DSNGBP0_LOCK1    K DXRIBP0$$IBPA001 A   18432487   460    107     0      0  2
_ DSNGBP0_GBP5     C DB2_DBPA         A   16670535   125    139    12   2149  2
_ DSNGBP0_GBP2     C DB2_DBPA         A   14469636   153    121     1    351  2
_ DSNGBP0_LOCK1    K DXRIBP0$$IBP2002 A    5355798    41     91     0      0  2
_ DSNGBP0_GBP4     C DB2_DBPA         A    4286684   163    165     4   8320  2
_ ISTGENERIC       S DKDDBN00DKDDBM22 A    3335916     3    136     0      0  3
_ DSNGBP0_GBP1     C DB2_DBP2         A    1864873    14    137     1    869  2
_ DSNGBP0_GBP5     C DB2_DBP2         A    1616268     7    125     0   2449  2
_ ISTGENERIC       S DKDDBN00DKDDBM23 A    1452724     1    118     0      0  3
_ ISGLOCK      L3  K ISGLOCK#CCPU     A    1398772     0     88     0      0  0
_ DSNGBP0_GBP0     C DB2_DBPA         A    1152568     0    164     0      0  2
_ DSNGBP0_GBP4     C DB2_DBP2         A     939258     4    133     0      0  2
_ ISGLOCK      L4  K ISGLOCK#FCPU     A     888491     4     81     0      0  0
_ ISTGENERIC       S DKDDBN00DKDDBM24 A     753464     2    115     0      0  3
_ DSNGBP0_GBP2     C DB2_DBP2         A     276841     0    137     0    473  2
_ DSNGBP0_SCA      L DB2_DBPA         A     115916     0    292     0      0  1
_ DSNGBP0_SCA      L DB2_DBP2         A      96955     0    231     0      0  1
_ DSNGBP0_GBP0     C DB2_DBP2         A      54820     0     97     0      0  2
_ DSNGBP0_GBP7     C DB2_DBPA         A      18433     0    118     0      0  2
_ DSNGBP0_GBP7     C DB2_DBP2         A        156     0      0     0      0  2
_ IEFAUTOS         S IEFAUTOSACPU     A         27     0      0     0      0  0
_ IEFAUTOS         S IEFAUTOSCCPU     A         26     0      0     0      0  0
_ IEFAUTOS         S IEFAUTOSFCPU     A         25     0      0     0      0  0
_ IEFAUTOS         S IEFAUTOSBCPU     A         24     0      0     0      0  0
```

Figure 46. CF Monitor - Connections Display (Brabrand)

For more information on **L1** , refer to page 25
For more information on **L2** , refer to page 25
For more information on **L3** , refer to page 25
For more information on **L4** , refer to page 25

```
CFLP0400               Systems Activity Summary
                                                            Num-sys 4
                                                            System  MASTER
CFname CF02B    Busy %  1 (05)   CP 2 Used space K: 1093888  54%   CF level 4
<----- Last cycle 10 sec ------------   Interval 071:38:55  Secs 257935    --->
                     <---------- Sync ----------> <---------- Async ---------->
            Total req  Total req  Interval  Dly Chg Total req  Interval  Que Nsc
  System    115980836  112776459  Avg    435  %  %    3204377   Avg    11  %  %
- -------- B--M--K--- B--M--K--- -R/T- -Rate -- -- B--M--K--- -R/T- -Rate -- --
_ ACPU       50501861   50501861   83   195  0  0          0     0     0  0  0
_ BCPU       60020160   56978543  128   220  0  0    3041617   932    11 19 19
_ CCPU        1401077    1401077  112     5  0  0          0     0     0  0  0
_ FCPU        4057738    3894978 2371    15  0  0     162760  6580     0  1  1
```

Figure 47. CF Monitor - Systems Activity Summary (Brabrand)

```
CFLP0011      CF Monitor - Coupling Facilities Activity Summary
                                                               Num-sys 3
                                                               SYSID   MASTER
                        CFRM Policy  POCFRM01 Activated at: 97.346 17:05:58
                                              Updated   at: 97.346 17:00:27
<----- Last cycle  10  sec  -----------  Interval 043:54:46  Secs 158086    --->
                      <---------- Sync ----------><---------- Async ---------->
          Bsy Max Stg  Total req  Interval  Dly Chg Total req  Interval  Que Nsc
  CFname    % Bsy   %             Avg         %   %            Avg         %   %
- ------- --- --- --- B--M--K--- -R/T- -Rate -- -- B--M--K--- -R/T- -Rate -- ---
_ CF01E     6  56  36  137402091   120   869  0  0    4412150  1099    28 26  26
_ CF02E     4  57  49  103494317   137   655  0  3   19461510   504   123 21  21
```

Figure 48. CF Monitor - Coupling Facilities Activity Summary (Ejby)

```
CFLP0240            Structure Display - SYSID   MVSC
Structure       DSNGEP0_GBP1      CF CF02E    Allocated at 98.088 10:17:41
Size,K  512000  Type Cache  Dir.     232099   In use 165056   Highest 188144  H
CF   %  25                  Elements 116047   In use 116043   Highest 116044
Reads    2524886      Writes    10944658      Dir reclaims    0
Castouts 3811112      XI's      354174        El. reclaims    574026
Preference List CF02E  CF01E
Exclusion  List
Disposition DELETE         Max Connections 32       Access Time 0
--- ---------------- ----------- ---------- -------  -------- ---- -------- ---
                     ---Cycle---  Interval
Sel Connection name  Sync  Async  Tot Reqs  Sysname  Jobname  ASID Status   CFL
                                 b--m--k---
 _  DB2_DEP2            3     0    1550952 MVSC     DEP2DBM1 00C6 ACTIVE    2
 _  DB2_DB2P           91     1   20493775 MVSA     DB2PDBM1 0039 ACTIVE    2
```

Figure 49. CF Monitor - Structure Display - SYSID MVSC (Ejby)

For more information on **H**, refer to page 24

B.3 Display DB2 Commands

```
 -DISPLAY GROUPBUFFERPOOL(GBP4) GDETAIL(*)
DSNB750I -DB2P DISPLAY FOR GROUP BUFFER POOL GBP4 FOLLOWS
DSNB755I -DB2P DB2 GROUP BUFFER POOL STATUS
             CONNECTED                                 = YES
             CURRENT DIRECTORY TO DATA RATIO           = 5
             PENDING DIRECTORY TO DATA RATIO           = 5
DSNB756I -DB2P   CLASS CASTOUT THRESHOLD                   = 10%
             GROUP BUFFER POOL CASTOUT THRESHOLD       = 50%
             GROUP BUFFER POOL CHECKPOINT INTERVAL     = 8 MINUTES
             RECOVERY STATUS                           = NORMAL
DSNB757I -DB2P MVS CFRM POLICY STATUS FOR DSNGEP0_GBP4     = NORMAL
             MAX SIZE INDICATED IN POLICY              = 420000 KB
             ALLOCATED                                 = YES
DSNB758I -DB2P     ALLOCATED SIZE                          = 320000
KB
               VOLATILITY STATUS                       = VOLATILE
DSNB759I -DB2P     NUMBER OF DIRECTORY ENTRIES             = 319309
               NUMBER OF DATA PAGES                    = 63858
               NUMBER OF CONNECTIONS                   = 2
DSNB783I -DB2P CUMULATIVE GROUP DETAIL STATISTICS SINCE 04:42:36 MAR
129, 1998
DSNB784I -DB2P GROUP DETAIL STATISTICS
             READS
               DATA RETURNED                           = 4201465
DSNB785I -DB2P     DATA NOT RETURNED
                 DIRECTORY ENTRY EXISTED               = 4601036
                 DIRECTORY ENTRY CREATED               = 13547609
                 DIRECTORY ENTRY NOT CREATED           = 166967420, 0
DSNB786I -DB2P   WRITES
               CHANGED PAGES                           = 87026863
               CLEAN PAGES                             = 0
               FAILED DUE TO LACK OF STORAGE           = 38
             CHANGED PAGES SNAPSHOT VALUE              = 10795
DSNB787I -DB2P   RECLAIMS
               FOR DIRECTORY ENTRIES                   = 5749073
               FOR DATA ENTRIES                        = 20558173
             CASTOUTS                                  = 29326210
DSNB788I -DB2P   CROSS INVALIDATIONS
               DUE TO DIRECTORY RECLAIMS               = 4555696  M
               DUE TO WRITES                           = 1470513
DSNB790I -DB2P DISPLAY FOR GROUP BUFFER POOL GBP4 IS COMPLETE
DSN9022I -DB2P DSNB1CMD '-DISPLAY GROUPBUFFERPOOL' NORMAL COMPLETION
DSN
```

Figure 50. DISPLAY GROUPBUFFERPOOL(GBP4) GDETAIL(*) (Ejby)

For more information on **M**, refer to page 27

Appendix C. Couple Data Set Details

The following CDS details refer to the sysplex configurations in Brabrand and Ejby.

C.1 Brabrand (DDBPLEXB)

- Sysplex couple data sets:
  1. Primary:
     ```
     DSN: SYS1.DDBPLEXB.XCF01
     VOLSER: MVSX11     DEVN: 2102
     FORMAT TOD         MAXSYSTEM MAXGROUP(PEAK) MAXMEMBER(PEAK)
     03/17/1998 08:48:25        8      60   (35)      503  (140)
     ```
  2. Alternate:
     ```
     DSN: SYS1.DDBPLEXB.XCF02
     VOLSER: MVSX04     DEVN: 0DBC
     FORMAT TOD         MAXSYSTEM    MAXGROUP        MAXMEMBER
     03/17/1998 08:48:32        8       60              503
     ```
- ARM couple data sets:
  1. Primary:
     ```
     DSN: SYS1.DDBPLEXB.PLEXAP01
     VOLSER: MVSX04     DEVN: 0DBC
     FORMAT TOD         MAXSYSTEM
     11/14/1997 09:51:57        8
     ```
  2. Alternate:
     ```
     DSN: SYS1.DDBPLEXB.PLEXAP02
     VOLSER: MVSX11     DEVN: 2102
     FORMAT TOD         MAXSYSTEM
     11/14/1997 09:52:10        8
     ```
- CFRM couple data sets:
  1. Primary:
     ```
     DSN: SYS1.DDBPLEXB.PLEXAP01
     VOLSER: MVSX04     DEVN: 0DBC
     FORMAT TOD         MAXSYSTEM
     11/14/1997 09:51:57        8
     ```
  2. Alternate:
     ```
     DSN: SYS1.DDBPLEXB.PLEXAP02
     VOLSER: MVSX11     DEVN: 2102
     FORMAT TOD         MAXSYSTEM
     11/14/1997 09:52:10        8
     ```
- LOGR couple data sets:
  1. Primary:
     ```
     DSN: SYS1.DDBPLEXB.PLEXAP01
     VOLSER: MVSX04     DEVN: 0DBC
     FORMAT TOD         MAXSYSTEM
     11/14/1997 09:51:57        8
     ```
  2. Alternate:

```
DSN: SYS1.DDBPLEXB.PLEXAP02
VOLSER: MVSX11     DEVN: 2102
FORMAT TOD         MAXSYSTEM
11/14/1997 09:52:10        8
```

- SFM COUPLE DATA SETS

  1. Primary:

```
DSN: SYS1.DDBPLEXB.PLEXAP01
VOLSER: MVSX04     DEVN: 0DBC
FORMAT TOD         MAXSYSTEM
11/14/1997 09:51:57        8
```

  2. Alternate:

```
DSN: SYS1.DDBPLEXB.PLEXAP02
VOLSER: MVSX11     DEVN: 2102
FORMAT TOD         MAXSYSTEM
11/14/1997 09:52:10        8
```

C.2 Ejby (DDBPLEXE)

- Sysplex couple data sets:

  1. Primary:

```
DSN: SYS1.XCF01
VOLSER: MVSX10     DEVN: 01D4
FORMAT TOD         MAXSYSTEM MAXGROUP(PEAK) MAXMEMBER(PEAK)
01/11/1997 00:04:43        8      50   (44)      503  (117)
```

  2. Alternate:

```
DSN: SYS1.XCF02
VOLSER: MVSX11     DEVN: 213E
FORMAT TOD         MAXSYSTEM    MAXGROUP        MAXMEMBER
01/11/1997 00:11:32        8       50              503
```

- ARM couple data sets:

  1. Primary:

```
DSN: SYS1.DDBPLEXE.PLEXAP01
VOLSER: MVSX11     DEVN: 213E
FORMAT TOD         MAXSYSTEM
07/31/1997 09:34:05        8
```

  2. Alternate:

```
DSN: SYS1.DDBPLEXE.PLEXAP02
VOLSER: MVSX10     DEVN: 01D4
FORMAT TOD         MAXSYSTEM
07/31/1997 09:34:51        8
```

- CFRM couple data sets:

  1. Primary:

```
DSN: SYS1.DDBPLEXE.PLEXAP01
VOLSER: MVSX11     DEVN: 213E
FORMAT TOD         MAXSYSTEM
07/31/1997 09:34:05        8
```

  2. Alternate:

```
DSN: SYS1.DDBPLEXE.PLEXAP02
VOLSER: MVSX10     DEVN: 01D4
FORMAT TOD         MAXSYSTEM
07/31/1997 09:34:51        8
```

- LOGR couple data sets:

  1. Primary:

     ```
     DSN: SYS1.DDBPLEXE.PLEXAP01
     VOLSER: MVSX11     DEVN: 213E
     FORMAT TOD         MAXSYSTEM
     07/31/1997 09:34:05        8
     ```

  2. Alternate:

     ```
     DSN: SYS1.DDBPLEXE.PLEXAP02
     VOLSER: MVSX10     DEVN: 01D4
     FORMAT TOD         MAXSYSTEM
     07/31/1997 09:34:51        8
     ```

- SFM couple data sets:

  1. Primary:

     ```
     DSN: SYS1.DDBPLEXE.PLEXAP01
     VOLSER: MVSX11     DEVN: 213E
     FORMAT TOD         MAXSYSTEM
     07/31/1997 09:34:05        8
     ```

  2. Alternate:

     ```
     DSN: SYS1.DDBPLEXE.PLEXAP02
     VOLSER: MVSX10     DEVN: 01D4
     FORMAT TOD         MAXSYSTEM
     07/31/1997 09:34:51        8
     ```

Appendix D. Special Notices

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Appendix E. Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

E.1 International Technical Support Organization Publications

For information on ordering these ITSO publications see "How to Get ITSO Redbooks" on page 87.

- *Batch Processing in a Parallel Sysplex*, SG24-5329
- *DB2 for OS/390 Capacity Planning*, SG24-2244
- *OS/390 MVS Parallel Sysplex Configuration Volume 1: Overview*, SG24-2075
- *OS/390 MVS Parallel Sysplex Configuration Volume 2: Cookbook*, SG24-2076
- *OS/390 MVS Parallel Sysplex Configuration Volume 3: Connectivity*, SG24-2077
- *OS/390 MVS Parallel Sysplex Capacity Planning*, SG24-4680
- *Parallel Sysplex CF Online Monitor: Installation and User's Guide*, SG24-5153
- *S/390 Parallel Sysplex Performance*, SG24-4356

E.2 Redbooks on CD-ROMs

Redbooks are also available on the following CD-ROMs. Click the CD-ROMs button at `http://www.redbooks.ibm.com/` for information about all the CD-ROMs offered, updates and formats.

CD-ROM Title	Collection Kit Number
System/390 Redbooks Collection	SK2T-2177
Networking and Systems Management Redbooks Collection	SK2T-6022
Transaction Processing and Data Management Redbooks Collection	SK2T-8038
Lotus Redbooks Collection	SK2T-8039
Tivoli Redbooks Collection	SK2T-8044
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RS/6000 Redbooks Collection (BkMgr Format)	SK2T-8040
RS/6000 Redbooks Collection (PDF Format)	SK2T-8043
Application Development Redbooks Collection	SK2T-8037

E.3 Other Publications

These publications are also relevant as further information sources:

- *DB2 for MVS/ESA V4 Data Sharing: Planning and Administration*, SC26-3269
- *DB2 for OS/390 V5 Data Sharing: Planning and Administration*, SC26-8961
- *OS/390 MVS Setting up a Sysplex*, GC28-1779
- *OS/390 MVS Initialization and Tuning Reference*, SC28-1751 (some releases might be avaliable softcopy only from the OS/390 Online Library Collection, SK2T-6700).
- *OS/390 MVS RMF Report Analysis*, SC28-1950

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Glossary

Explanations of Cross-References: The following cross-references are used in this glossary:

Contrast with. This refers to a term that has an opposed or substantively different meaning.

See. This refers the reader to multiple-word terms in which this term appears.

See also. This refers the reader to terms that have a related, but not synonymous meaning.

Synonym for. This indicates that the term has the same meaning as a preferred term, which is defined in the glossary.

If you do not find the term you are looking for, see the IBM Software Glossary at the URL:
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A

asynchronous. Without regular time relationship. Unexpected or unpredictable with respect to the program's instructions, or to time. Contrast with synchronous.

authorized program analysis report (APAR). A request for correction of a problem caused by a defect in a current release of a program unaltered the user.

availability. A measure of how much (often specified as a percentage) the data processing services are available to the users in a specified time frame.

B

base or basic sysplex. A base or basic sysplex is the set of one or more OS/390 systems that is given a cross-system coupling facility (XCF) name and in which the authorized programs can then use XCF coupling services. A base sysplex does not include a CF. See also *Parallel Sysplex* and *sysplex*.

buffer. (1) A portion of storage used to hold input or output data temporarily. (2) A routine or storage used to compensate for a difference in data rate or time of occurrence of events, when transferring data from one device to another.

buffer invalidation. A technique for preventing the use of invalid data in a Parallel Sysplex data sharing environment. The technique involves marking all copies of data in DB2 or IMS buffers invalid once a sharing DBMS subsystem has updated that data.

buffer pool. A set of buffers that contains buffers of the same length. See also *buffer*, *buffer invalidation*, and *group buffer pool*.

C

cache structure. A CF structure that enables high-performance sharing of cached data by multisystem applications in a sysplex. Applications can use a cache structure to implement several different types of caching systems, including a store-through or a store-in cache. As an example, DB2 uses data sharing group cache structures as GBPs. See also *group buffer pool*, *castout*, and *cache structure services*.

cache structure services. OS/390 services that enable applications in a sysplex to perform operations such as the following on a CF cache structure:

- Manage cache structure resources.
- Store data into and retrieve data from a cache structure.
- Manage accesses to shared data.
- Determine when shared data has been changed.
- Determine whether a local copy of shared data is valid.

castout. The DB2 process of writing changed pages from a GBP to DASD.

central processing unit (CPU). The part of a computer that includes the circuits that control the interpretation and execution of instructions.

central processor (CP). The part of the computer that contains the sequencing and processing facilities for instruction execution, initial program load, and other machine operations. See also *central processor complex*.

central processor complex (CPC). A physical collection of hardware that includes central storage, one or more CPs, timers, and channels.

central storage. Storage that is an integral part of the processor unit. Central storage includes both main storage and the hardware system area.

CF. Coupling Facility.

CFCC. Coupling Facility Control Code. See also *Coupling Facility Control Code*.

CFRM policy. A declaration regarding the allocation rules for a CF structure. See also *structure*.

channel. (1) A functional unit, controlled by a S/390 CPC that handles the transfer of data between processor storage and local peripheral equipment. (2) A path along which signals can be sent. (3) The portion of a storage medium that is accessible to a given reading or writing station. (4) In broadband transmission, a designation of a frequency band 6MHz wide.

channel-to-channel (CTC). Refers to the communication (transfer of data) between programs on opposite sides of a channel-to-channel adapter (CTCA).

channel-to-channel adapter (CTCA). A hardware device that can be used to connect two channels on the same computing system or on different systems.

commit. In data processing the point at which the data updates are written to the database in a way which is irrevocable.

continuous availability. The elimination or masking of both planned and unplanned outages, so that no system outages are apparent to the end user.

Continuous availability can also be stated as the ability to operate 24 hours/day, 7 days/week, with no outages apparent to the end user.

continuous operations. The elimination or masking of planned outages. A system that delivers continuous operations is a system that has no scheduled outages.

couple data set. A data set that is created through the XCF couple data set format utility and, depending on its designated type, is shared by some or all of the OS/390 systems in a sysplex. See also *Sysplex couple data set* and *XCF couple data set*.

Coupling Facility (CF). A special LP that provides high-speed caching, list processing, and locking functions in Parallel Sysplex. See also *Coupling Facility channel*, *Coupling Facility white space*, and *coupling services*.

Coupling Facility channel (CF link). A high bandwidth fiber optic channel that provides the high-speed connectivity required for data sharing between a CF and the CPCs directly attached to it.

Coupling Facility Control Code (CFCC). The Licensed Internal Code (LIC) that runs in a CF LP to provide shared storage management functions for a sysplex.

Coupling Facility white space. CF storage set aside for rebuilding of structures from other CFs, in case of failure.

coupling services. In a sysplex, the functions of XCF that transfer data and status between members of a group residing on one or more OS/390 systems in the sysplex.

cross-system coupling facility (XCF). XCF is a component of OS/390 that provides functions to support cooperation between authorized programs running within a sysplex.

cross-system extended services (XES). Provides services for OS/390 systems in a sysplex to share data on a CF.

D

data link. (1) Any physical link, such as a wire or a telephone circuit, that connects one or more remote terminals to a communication control unit, or connects one communication control unit with another. (2) The assembly of parts of two data terminal equipment (DTE) devices that are controlled by a link protocol and the interconnecting data circuit, and that enable data to be transferred from a data source to a data link. (3) In SNA, see also *link*.
Note: A telecommunication line is only the physical medium of transmission. A data link includes the physical medium of transmission, the protocol, and associated devices and programs; it is both physical and logical.

data set. The major unit of data storage and retrieval, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the system has access.

data sharing. In Parallel Sysplex, the ability of concurrent subsystems (such as DB2 or IMS database managers) or application programs to directly access and change the same data while maintaining data integrity. See also *Sysplex data sharing* and *data sharing group*.

data sharing group. A collection of one or more subsystems that directly access and change the same data while maintaining data integrity. See also *DB2 data sharing group*.

database. (1) A set of data, or a part or the whole of another set of data, that consists of at least one file and is sufficient for a given purpose or for a given data-processing system. (2) A collection of data fundamental to a system. See also *data sharing*, and *data sharing group*.

DB2 data sharing group. A collection of one or more concurrent DB2 subsystems that directly access and change the same data while maintaining data integrity.

DDF. Distributed Data Facility (DB2). DB2 subsystem running in an address space that supports VTAM communications with other DB2 subsystems and supports the execution of distributed database access requests on behalf of remote users. This provides isolation of remote function execution from local function execution.

directory. A list of files that are stored on a disk or diskette. A directory also contains information about the file, such as size and date of last change.

dynamic CF dispatching. With dynamic CF dispatching, the CF will monitor the request rate that is driving it and adjust its usage of CP resource accordingly. If the request rate becomes high enough, the CF will revert back to its original dispatching algorithm, constantly looking for new work. When the request rate lowers, the CF again becomes more judicious with its use of CP resource. See also *dynamic ICF expansion*.

dynamic ICF expansion. For CFCC levels that include dynamic CF dispatching support, the CF will not necessarily consume entire run time intervals at low request rate times. At low request rates, each CF CP consume far less than 1/8th of a physical CP. The CP resource consumption may be more in the 1% to 2% range. At higher request rates (for example, when the CF is actually busy handling requests), the 1/8th minimum will again become effective. See also *dynamic CF dispatching*.

E

EMIF. Enhanced multiple image facility (formerlly ESCON multiple image facility). A facility which allows the sharing of FICON or ESCON channels between LPs.

exclusive lock. A lock that prevents concurrently executing application processes from reading or changing data. Contrast with *shared lock.*

F

false lock contention. A contention indication from the CF when multiple lock names are hashed to the same indicator and when there is no real contention.

G

generic resource name. A name used by VTAM that represents several application programs that provide the same function in order to handle session distribution and balancing in a sysplex.

goal mode. A mode of processing where the active service policy determines system resource management.

group buffer pool. A CF cache structure used by a DB2 data sharing group to cache data and to ensure that the data is consistent for all members. See also *buffer pool*.

group services. Services for establishing connectivity among the multiple instances of a program, application, or subsystem (members of a group running on OS/390) in a sysplex. Group services allow members of the group to coordinate and monitor their status across the systems of a sysplex.

H

Hardware Management Console. A console used to monitor and control hardware such as the 9672 CPCs.

hardware system area (HSA). A logical area of central storage, not addressable by application programs, used to store Licensed Internal Code and control information.

HiPerLink. A HiPerLink provides improved CF link efficiency and response times in processing CF requests, compared to previous CF link configurations. With HiPerLinks, current data sharing overheads are reduced and CF link capacity is improved.

I

ICF. Integrated Catalog Facility.

Integrated Cluster Bus channel (ICB). The Integrated Cluster Bus channel uses the Self Timed Interface to perform the S/390 coupling communication. The cost of coupling is reduced by using a higher performing (approximately 280 MB/sec) but less complex transport link suitable for the relatively short distances (The cable is 10 meters; the distance between CPCs is approximately 7 meters).

Internal Coupling channel (IC). The Internal Coupling channel emulates the coupling facility functions in microcode between images within a single CPC. It is a high performance channel transferring data at up to 6 Gb/sec. Internal Coupling implementation is a totally logical channel requiring no channel or even cable hardware. However, a CHPID number must be defined in the IOCDS. A replacement for ICMF.

Internal Coupling Facility (ICF). The Internal Coupling Facility (ICF) uses up to two spare PUs on selected S/390 CPCs. The ICF may use CF links or emulated links (ICMF). It can be used initially as an entry configuration into Parallel Sysplex and then maintained as a backup configuration in the future.

invalidation. The process of removing records from cache because of a change in status of a subsystem facility or function, or because of an error while processing the cache image of the set of records. When such a cache image is invalidated, the corresponding records cannot be accessed in cache and the assigned cache space is available for allocation.

L

link. The combination of physical media, protocols, and programming that connects devices.

list structure. A CF structure that enables multisystem applications in a sysplex to share information organized as a set of lists or queues. A list structure consists of a set of lists and an optional lock table, which can be used for serializing resources in the list structure. Each list consists of a queue of list entries.

list structure services. OS/390 services that enable multisystem applications in a sysplex to perform operations such as the following on a CF list structure:

- Read, update, create, delete, and move list entries in a list structure.
- Perform serialized updates on multiple list entries in a list structure.
- Monitor lists in a list structure for transitions from empty to non-empty.

local cache. A buffer in local system storage that might contain copies of data entries in a CF cache structure.

lock resource. Data accessed through a CF structure.

lock structure. A CF structure that enables applications in a sysplex to implement customized locking protocols for serialization of application-defined resources. The lock structure supports shared, exclusive, and application-defined lock states, as well as generalized contention management and recovery protocols. See also *exclusive lock, shared lock,* and *false lock contention*.

lock structure services. OS/390 services that enable applications in a sysplex to perform operations such as the following on a CF lock structure:

- Request ownership of a lock.
- Change the type of ownership for a lock.
- Release ownership of a lock.
- Manage contention for a lock.
- Recover a lock held by a failed application.

logical partition (LP). In LPAR mode, a subset of the processor unit resources that is defined to support the operation of a system control program (SCP). See also *logically partitioned (LPAR) mode*.

logically partitioned (LPAR) mode. A CPC power-on reset mode that enables use of the PR/SM feature and allows an operator to allocate CPC hardware resources (including CPs, central storage, expanded storage, and channel paths) among logical partitions. Contrast with *basic mode*.

M

multisystem sysplex. A sysplex in which two or more OS/390 images are allowed to be initialized as part of the sysplex. See also *single-system sysplex*.

P

P-lock. There are times when a P-lock must be obtained on a page to preserve physical consistency of the data between members. These locks are known as page P-locks. Page P-locks are used, for example, when two subsystems attempt to update the same page of data and row locking is in effect. They are also used for GBP-dependent space map pages and GBP-dependent leaf pages for type 2 indexes, regardless of locking level. IRLM P-locks apply to both DB2 and IMS DB data sharing.

Parallel Sysplex. A Parallel Sysplex is a sysplex with one or more CFs. See also *base sysplex*, *sysplex*, *extended Parallel Sysplex*, and *standard Parallel Sysplex*.

partition. An area of storage on a fixed disk that contains a particular operating system or logical drives where data and programs can be stored.

performance. For a storage subsystem, a measurement of effective data processing speed against the amount of resource that is consumed by a complex. Performance is largely determined by throughput, response time, and system availability.

policy. A set of installation-defined rules for managing sysplex resources. The XCF PR/SM policy and sysplex failure management policy are examples of policies.

preference list. An installation list of CFs, in priority order, that indicates where OS/390 is to allocate a structure.

S/390 Resource Sharing provides the following functionality:

- XCF Signalling - providing multisystem signaling with reduced cost/management
- GRS Star - multisystem resource serialization for increased performance, recoverability and scalability
- JES Checkpointing - multisystem checkpointing for increased simplicity and reduced cost
- Shared Tape - multisystem tape sharing

- Merged Operations Log - multisystem log
- Merged LOGREC - multisystem log
- Shared Catalog - multisystem shared master catalogs/user catalogs

R

response time. The amount of time it takes after a user presses the enter key at the terminal until the reply appears at the terminal.

S

service class. A subset of a workload having the same service goals or performance objectives, resource requirements, or availability requirements. For workload management, you assign a service goal and optionally a resource group to a service class.

shared. Pertaining to the availability of a resource to more than one use at the same time.

shared lock. A lock that prevents concurrently executing application processes from changing, but not from reading, data. Contrast with *exclusive lock.*

single-system sysplex. A sysplex in which only one OS/390 system is allowed to be initialized as part of the sysplex. In a single-system sysplex, XCF provides XCF services on the system but does not provide signalling services between OS/390 systems. See also *multisystem sysplex* and *XCF-local mode.*

structure. A construct used to map and manage storage in a CF. See *cache structure, list structure*, and *lock structure.*

synchronous. (1) Pertaining to two or more processes that depend on the occurrences of a specific event such as common timing signal. (2) Occurring with a regular or predictable timing relationship.

sysplex. A set of OS/390 systems communicating and cooperating with each other through certain multisystem hardware components and software services to process customer workloads. There is a distinction between a base sysplex and a Parallel Sysplex. See also *base sysplex* and *Parallel Sysplex*.

sysplex couple data set. A couple data set that contains sysplex-wide data about systems, groups, and members that use XCF services. All OS/390 systems in a sysplex must have connectivity to the sysplex couple data set. See also *couple data set*.

sysplex data sharing. The ability of multiple IMS subsystems to share data across multiple OS/390 images. Sysplex data sharing differs from two-way data sharing in that the latter allows sharing across only two OS/390 images.

sysplex failure management. The OS/390 function that minimizes operator intervention after a failure occurs in the sysplex. The function uses installation-defined policies to ensure continued operations of work defined as most important to the installation.

sysplex management. The functions of XCF that control the initialization, customization, operation, and tuning of OS/390 systems in a sysplex.

V

validity vector. On a CPC, a bit string that is manipulated by cross-invalidate to present a user connected to a structure with the validity state of pages in its local cache.

X

XCF. See *cross-system coupling facility*.

XCF couple data set. The name for the sysplex couple data set prior to MVS SP V5.1. See *sysplex couple data set*.

XCF group. A group is the set of related members defined to XCF by a multisystem application in which members of the group can communicate (send and receive data) between OS/390 systems with other members of the same group. A group can span one or more of the systems in a sysplex and represents a complete logical entity to XCF.

XCF-local mode. The state of a system in which XCF provides limited services on one system and does not provide signalling services between OS/390 systems. See also *single-system sysplex*.

XCF PR/SM policy. In a multisystem sysplex on PR/SM, the actions that XCF takes when one OS/390 system in the sysplex fails. This policy provides high availability for multisystem applications in the sysplex.

XES. See *cross-system extended services.*

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