z/OS Communications Server

CSM Guide

Version 1 Release 2

SC31-8808-00

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Note:
Before using this information and the product it supports, be sure to read the general information under “Appendix E. Notices” on page 89.

First Edition (October 2001)

This edition applies to Version 1 Release 2 of z/OS (5694-A01) and to all subsequent releases and modifications until otherwise indicated in new editions.

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About This Book

This manual is intended to help customers write application programs that use the communications storage manager (CSM). It describes the CSM application program interface (API). It also describes the IVTCSM macro and the programming techniques for using this macro. It is intended to be used by application programs using the HPDT interface. Refer to the *z/OS Communications Server: SNA Programmer's LU 6.2 Guide* for information about how VTAM® application programs use the HPDT interface.

Who Should Use This Book

This book is for system programmers who code authorized application programs for a System/390® or zSeries host. This audience can include programmers who are modifying existing programs or writing new ones. The manual can also be of use to planners who are estimating the amount of work required to use the application programming interface (API) for CSM.

You should be familiar with programming concepts and programming VTAM applications, as described in *z/OS Communications Server: SNA Programming*, before you use the macroinstructions described in this book.

Knowledge of the following concepts is recommended:

- Systems network architecture
- Data communications
- LU 6.2 architecture

Typographic Conventions Used in This Book

This publication uses the following typographic conventions:

- Commands that you enter verbatim onto the command line are presented in **bold**.
- Variable information and parameters that you enter within commands, such as filenames, are presented in *italic*.
- System responses are presented in `monospace`.

Where to Find More Information

This section contains:

- Pointers to information available on the Internet
- Information about licensed documentation
- Information about LookAt, the online message tool
- A set of tables that describes the books in the z/OS Communications Server (z/OS CS) library, along with related publications

Where to Find Related Information on the Internet

Home Page	**Web address**
z/OS	http://www.ibm.com/servers/eserver/zseries/zos/
z/OS Internet Library	http://www.ibm.com/servers/eserver/zseries/zos/bkserv/

IBM Communications Server product
http://www.software.ibm.com/network/commserver/
IBM Communications Server support
http://www.software.ibm.com/network/commserver/support/
IBM Systems Center publications
http://www.redbooks.ibm.com/
IBM Systems Center flashes
http://www-1.ibm.com/support/techdocs/atsmastr.nsf
VTAM and TCP/IP
http://www.software.ibm.com/network/commserver/about/csos390.html
IBM http://www.ibm.com
RFC http://www.ietf.org/rfc.html

Information about Web addresses can also be found in informational APAR II11334.

DNS Web Sites

For information about DNS, see the following Web sites:

USENET news groups:
comp.protocols.dns.bind

For BIND mailing lists, see:

- http://www.isc.org/ml-archives/
  - BIND Users
    - Subscribe by sending mail to bind-users-request@isc.org
    - Submit questions or answers to this forum by sending mail to bind-users@isc.org
  - BIND 9 Users (Note: This list may not be maintained indefinitely.)
    - Subscribe by sending mail to bind9-users-request@isc.org
    - Submit questions or answers to this forum by sending mail to bind9-users@isc.org

For definitions of the terms and abbreviations used in this book, you can view or download the latest *IBM Glossary of Computing Terms* at the following Web address:

http://www.ibm.com/ibm/terminology

Note: Any pointers in this publication to Web sites are provided for convenience only and do not in any manner serve as an endorsement of these Web sites.

Licensed Documents

z/OS Communications Server licensed documentation in PDF format is available on the Internet at the IBM Resource Link Web site at http://www.ibm.com/servers/resourcelink. Licensed books are available only to customers with a z/OS Communications Server license. Access to these books requires an IBM Resource Link Web user ID and password, and a key code. With your z/OS Communications Server order, you received a memo that includes this key code. To obtain your IBM Resource Link Web user ID and password, log on to http://www.ibm.com/servers/resourcelink. To register for access to the z/OS licensed books perform the following steps:

1. Log on to Resource Link using your Resource Link user ID and password.
2. Click on **User Profiles** located on the left-hand navigation bar.
3. Click on **Access Profile**.
4. Click on **Request Access to Licensed books.**

5. Supply your key code where requested and click on the **Submit** button.

If you supplied the correct key code, you will receive confirmation that your request is being processed. After your request is processed, you will receive an e-mail confirmation.

You cannot access the z/OS licensed books unless you have registered for access to them and received an e-mail confirmation informing you that your request has been processed. To access the licensed books:

1. Log on to Resource Link using your Resource Link user ID and password.
2. Click on **Library.**
3. Click on **zSeries**.
4. Click on **Software**.
5. Click on **z/OS Communications Server**.
6. Access the licensed book by selecting the appropriate element.

LookAt, an Online Message Help Facility

LookAt is an online facility that allows you to look up explanations for z/OS CS messages and system abends.

Using LookAt to find information is faster than a conventional search because LookAt goes directly to the explanation.

LookAt can be accessed from the Internet or from a TSO command line.

To use LookAt as a TSO command, LookAt must be installed on your host system. You can obtain the LookAt code for TSO from the LookAt Web site by clicking on **News and Help** or from the z/OS V1R2 Collection, SK3T-4269.

To find a message explanation from a TSO command line, simply enter **lookat+message ID**, as in the following example:

```
lookat ezz8477i
```

This results in direct access to the message explanation for message EZZ8477I.

You can use LookAt on the Internet at the following Web site:
www.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/lookat.html

To find a message explanation from the LookAt Web site, simply enter the message ID. You can select the release, if applicable.

How to Contact IBM® Service

For telephone assistance in problem diagnosis and resolution (in the United States or Puerto Rico), call the IBM Software Support Center anytime (1-800-237-5511). You will receive a return call within 8 business hours (Monday – Friday, 8:00 a.m. – 5:00 p.m., local customer time).

Outside of the United States or Puerto Rico, contact your local IBM representative or your authorized IBM supplier.

z/OS Communications Server Information

This section contains descriptions of the books in the z/OS Communications Server library.

z/OS Communications Server publications are available:

- Online at the z/OS Internet Library web page at http://www.ibm.com/servers/eserver/zseries/zos/
- In hardcopy and softcopy
- In softcopy only

Softcopy Information

Softcopy publications are available in the following collections:

Titles	Order Number	Description
z/OS V1R2 Collection	SK3T-4269	This is the CD collection shipped with the z/OS product. It includes the libraries for z/OS V1R2, in both BookManager and PDF formats.
z/OS Software Products Collection	SK3T-4270	This CD includes, in both BookManager and PDF formats, the libraries of z/OS software products that run on z/OS but are not elements and features, as well as the *Getting Started with Parallel Sysplex* bookshelf.
z/OS V1R2 and Software Products DVD Collection	SK3T-4271	This collection includes the libraries of z/OS (the element and feature libraries) and the libraries for z/OS software products in both BookManager and PDF format. This collection combines SK3T-4269 and SK3T-4270.
z/OS Licensed Product Library	SK3T-4307	This CD includes the licensed books in both BookManager and PDF format.
System Center Publication IBM S/390 Redbooks Collection	SK2T-2177	This collection contains over 300 ITSO redbooks that apply to the S/390 platform and to host networking arranged into subject bookshelves.

z/OS Communications Server Library

The following abbreviations follow each order number in the tables below.

HC/SC — Both hardcopy and softcopy are available.

SC — Only softcopy is available. These books are available on the CD Rom accompanying z/OS (SK3T-4269 or SK3T-4307). Unlicensed books can be viewed at the z/OS Internet library site.

Updates to books are available on RETAIN and in the document called *OS/390 DOC APARs and ++HOLD DOC data* which can be found at http://www.s390.ibm.com/os390/bkserv/ new_tech_info.html. See “Appendix D. Information Apars” on page 87 for a list of the books and the informational apars (info apars) associated with them.

Planning and Migration:

Title	Number	Format	Description
z/OS Communications Server: SNA Migration	GC31-8774	HC/SC	This book is intended to help you plan for SNA, whether you are migrating from a previous version or installing SNA for the first time. This book also identifies the optional and required modifications needed to enable you to use the enhanced functions provided with SNA.

Title	Number	Format	Description
z/OS Communications Server: IP Migration	GC31-8773	HC/SC	This book is intended to help you plan for TCP/IP Services, whether you are migrating from a previous version or installing IP for the first time. This book also identifies the optional and required modifications needed to enable you to use the enhanced functions provided with TCP/IP Services.

Resource Definition, Configuration, and Tuning:

Title	Number	Format	Description
z/OS Communications Server: IP Configuration Guide	SC31-8775	HC/SC	This book describes the major concepts involved in understanding and configuring an IP network. Familiarity with the z/OS operating system, IP protocols, z/OS UNIX System Services, and IBM Time Sharing Option (TSO) is recommended. Use this book in conjunction with the *z/OS Communications Server: IP Configuration Reference*.
z/OS Communications Server: IP Configuration Reference	SC31-8776	HC/SC	This book presents information for people who want to administer and maintain IP. Use this book in conjunction with the *z/OS Communications Server: IP Configuration Guide*. The information in this book includes: • TCP/IP configuration data sets • Configuration statements • Translation tables • SMF records • Protocol number and port assignments
z/OS Communications Server: SNA Network Implementation Guide	SC31-8777	HC/SC	This book presents the major concepts involved in implementing an SNA network. Use this book in conjunction with the *z/OS Communications Server: SNA Resource Definition Reference*.
z/OS Communications Server: SNA Resource Definition Reference	SC31-8778	HC/SC	This book describes each SNA definition statement, start option, and macroinstruction for user tables. It also describes NCP definition statements that affect SNA.Use this book in conjunction with the *z/OS Communications Server: SNA Network Implementation Guide*.
z/OS Communications Server: SNA Resource Definition Samples	SC31-8836	SC	This book contains sample definitions to help you implement SNA functions in your networks, and includes sample major node definitions.
z/OS Communications Server: AnyNet SNA over TCP/IP	SC31-8832	SC	This guide provides information to help you install, configure, use, and diagnose SNA over TCP/IP.
z/OS Communications Server: AnyNet Sockets over SNA	SC31-8831	SC	This guide provides information to help you install, configure, use, and diagnose sockets over SNA. It also provides information to help you prepare application programs to use sockets over SNA.

Operation:

Title	Number	Format	Description
z/OS Communications Server: IP User's Guide and Commands	SC31-8780	HC/SC	This book describes how to use TCP/IP applications. It contains requests that allow a user to: log on to a remote host using Telnet, transfer data sets using FTP, send and receive electronic mail, print on remote printers, and authenticate network users.
z/OS Communications Server: IP System Administrator's Commands	SC31-8781	HC/SC	This book describes the functions and commands helpful in configuring or monitoring your system. It contains system administrator's commands, such as NETSTAT, PING, TRACERTE and their UNIX counterparts. It also includes TSO and MVS commands commonly used during the IP configuration process.
z/OS Communications Server: SNA Operation	SC31-8779	HC/SC	This book serves as a reference for programmers and operators requiring detailed information about specific operator commands.
z/OS Communications Server: Quick Reference	SX75-0124	HC/SC	This book contains essential information about SNA and IP commands.

Customization:

Title	Number	Format	Description
z/OS Communications Server: SNA Customization	LY43-0092	SC	This book enables you to customize SNA, and includes the following: • Communication network management (CNM) routing table • Logon-interpret routine requirements • Logon manager installation-wide exit routine for the CLU search exit • TSO/SNA installation-wide exit routines • SNA installation-wide exit routines
z/OS Communications Server: IP Network Print Facility	SC31-8833	SC	This book is for system programmers and network administrators who need to prepare their network to route SNA, JES2, or JES3 printer output to remote printers using TCP/IP Services.

Writing Application Programs:

Title	Number	Format	Description
z/OS Communications Server: IP Application Programming Interface Guide	SC31-8788	SC	This book describes the syntax and semantics of program source code necessary to write your own application programming interface (API) into TCP/IP. You can use this interface as the communication base for writing your own client or server application. You can also use this book to adapt your existing applications to communicate with each other using sockets over TCP/IP.
z/OS Communications Server: IP CICS Sockets Guide	SC31-8807	SC	This book is for people who want to set up, write application programs for, and diagnose problems with the socket interface for CICS using z/OS TCP/IP.
z/OS Communications Server: IP IMS Sockets Guide	SC31-8830	SC	This book is for programmers who want application programs that use the IMS TCP/IP application development services provided by IBM's TCP/IP Services.

Title	Number	Format	Description
z/OS Communications Server: IP Programmer's Reference	SC31-8787	SC	This book describes the syntax and semantics of a set of high-level application functions that you can use to program your own applications in a TCP/IP environment. These functions provide support for application facilities, such as user authentication, distributed databases, distributed processing, network management, and device sharing. Familiarity with the z/OS operating system, TCP/IP protocols, and IBM Time Sharing Option (TSO) is recommended.
z/OS Communications Server: SNA Programming	SC31-8829	SC	This book describes how to use SNA macroinstructions to send data to and receive data from (1) a terminal in either the same or a different domain, or (2) another application program in either the same or a different domain.
z/OS Communications Server: SNA Programmer's LU 6.2 Guide	SC31-8811	SC	This book describes how to use the SNA LU 6.2 application programming interface for host application programs. This book applies to programs that use only LU 6.2 sessions or that use LU 6.2 sessions along with other session types. (Only LU 6.2 sessions are covered in this book.)
z/OS Communications Server: SNA Programmer's LU 6.2 Reference	SC31-8810	SC	This book provides reference material for the SNA LU 6.2 programming interface for host application programs.
z/OS Communications Server: CSM Guide	SC31-8808	SC	This book describes how applications use the communications storage manager.
z/OS Communications Server: CMIP Services and Topology Agent Guide	SC31-8828	SC	This book describes the Common Management Information Protocol (CMIP) programming interface for application programmers to use in coding CMIP application programs. The book provides guide and reference information about CMIP services and the SNA topology agent.

Diagnosis:

Title	Number	Format	Description
z/OS Communications Server: IP Diagnosis	GC31-8782	HC/SC	This book explains how to diagnose TCP/IP problems and how to determine whether a specific problem is in the TCP/IP product code. It explains how to gather information for and describe problems to the IBM Software Support Center.
z/OS Communications Server: SNA Diagnosis Vol 1 Techniques and Procedures and *z/OS Communications Server: SNA Diagnosis Vol 2 FFST Dumps and the VIT*	LY43-0088 LY43-0089	HC/SC	These books help you identify an SNA problem, classify it, and collect information about it before you call the IBM Support Center. The information collected includes traces, dumps, and other problem documentation.
z/OS Communications Server: SNA Data Areas Volume 1 and *z/OS Communications Server: SNA Data Areas Volume 2*	LY43-0090 LY43-0091	SC	These books describe SNA data areas and can be used to read an SNA dump. They are intended for IBM programming service representatives and customer personnel who are diagnosing problems with SNA.

Messages and Codes:

Title	Number	Format	Description
z/OS Communications Server: SNA Messages	SC31-8790	HC/SC	This book describes the ELM, IKT, IST, ISU, IUT, IVT, and USS messages. Other information in this book includes: • Command and RU types in SNA messages • Node and ID types in SNA messages • Supplemental message-related information
z/OS Communications Server: IP Messages Volume 1 (EZA)	SC31-8783	HC/SC	This volume contains TCP/IP messages beginning with EZA.
z/OS Communications Server: IP Messages Volume 2 (EZB)	SC31-8784	HC/SC	This volume contains TCP/IP messages beginning with EZB.
z/OS Communications Server: IP Messages Volume 3 (EZY)	SC31-8785	HC/SC	This volume contains TCP/IP messages beginning with EZY.
z/OS Communications Server: IP Messages Volume 4 (EZZ-SNM)	SC31-8786	HC/SC	This volume contains TCP/IP messages beginning with EZZ and SNM.
z/OS Communications Server: IP and SNA Codes	SC31-8791	HC/SC	This book describes codes and other information that appear in z/OS Communications Server messages.

APPC Application Suite:

Title	Number	Format	Description
z/OS Communications Server: APPC Application Suite User's Guide	GC31-8809	SC	This book documents the end-user interface (concepts, commands, and messages) for the AFTP, ANAME, and APING facilities of the APPC application suite. Although its primary audience is the end user, administrators and application programmers may also find it useful.
z/OS Communications Server: APPC Application Suite Administration	SC31-8835	SC	This book contains the information that administrators need to configure the APPC application suite and to manage the APING, ANAME, AFTP, and A3270 servers.
z/OS Communications Server: APPC Application Suite Programming	SC31-8834	SC	This book provides the information application programmers need to add the functions of the AFTP and ANAME APIs to their application programs.

Redbooks

The following Redbooks may help you as you implement z/OS Communications Server.

Title	Number
TCP/IP Tutorial and Technical Overview	GG24–3376
SNA and TCP/IP Integration	SG24–5291
IBM Communication Server for OS/390 V2R10 TCP/IP Implementation Guide: Volume 1: Configuration and Routing	SG24–5227
IBM Communication Server for OS/390 V2R10 TCP/IP Implementation Guide: Volume 2: UNIX Applications	SG24–5228
IBM Communication Server for OS/390 V2R10 TCP/IP Implementation Guide: Volume 3: MVS Applications	SG24–5229
OS/390 Secureway Communication Server V2R8 TCP/IP Guide to Enhancements	SG24–5631

Title	Number
TCP/IP in a Sysplex	SG24–5235
Managing OS/390 TCP/IP with SNMP	SG24–5866
Security in OS/390–based TCP/IP Networks	SG24–5383
IP Network Design Guide	SG24–2580

Related Information

For information about z/OS products, refer to *z/OS Information Roadmap* (SA22-7500). The Roadmap describes what level of documents are supplied with each release of z/OS Communications Server, as well as describing each z/OS publication.

The table below lists books that may be helpful to readers.

Title	Number
z/OS SecureWay Security Server Firewall Technologies	SC24-5922
S/390: OSA-Express Customer's Guide and Reference	SA22-7403
z/OS MVS Diagnosis: Procedures	GA22-7587
z/OS MVS Diagnosis: Reference	GA22-7588
z/OS MVS Diagnosis: Tools and Service Aids	GA22-7589

Determining If a Publication Is Current

As needed, IBM updates its publications with new and changed information. For a given publication, updates to the hardcopy and associated BookManager softcopy are usually available at the same time. Sometimes, however, the updates to hardcopy and softcopy are available at different times. Here is how to determine if you are looking at the most current copy of a publication:

1. At the end of a publication's order number there is a dash followed by two digits, often referred to as the dash level. A publication with a higher dash level is more current than one with a lower dash level. For example, in the publication order number GC28-1747-07, the dash level 07 means that the publication is more current than previous levels, such as 05 or 04.
2. If a hardcopy publication and a softcopy publication have the same dash level, it is possible that the softcopy publication is more current than the hardcopy publication. Check the dates shown in the Summary of Changes. The softcopy publication might have a more recently dated Summary of Changes than the hardcopy publication.
3. To compare softcopy publications, you can check the last two characters of the publication's filename (also called the book name). The higher the number, the more recent the publication. Also, next to the publication titles in the CD-ROM booklet and the readme files, there is an asterisk (*) that indicates whether a publication is new or changed.

Summary of Changes

Summary of Changes
for SC31-8808-00
z/OS Version 1 Release 2

This book contains information previously presented in *OS/390 V2R5 eNetwork Communications Server: CSM Guide*, SC31–8575.

New Information

- CSM data space pages can now be backed above the 2-gigabyte real storage bar. For details, see “Chapter 1. Introduction to the Communications Storage Manager” on page 1, “IVTCSM REQUEST=CREATE_POOL” on page 39, and “IVTCSM REQUEST=GET_BUFFER” on page 61.

This book contains terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

Chapter 1. Introduction to the Communications Storage Manager

The communications storage manager (CSM) is a component of VTAM that allows authorized host applications to share data with VTAM and other CSM users without having to physically copy the data.

CSM is provided as part of the HPDT family of services. HPDT optimizes system performance for the transfer of bulk data. By providing a means for authorized applications to share buffers, CSM improves system performance during the transfer of bulk data by reducing the processing required for data movement. As a result, CPU resources (CPU cycles, memory bus, and cache) are conserved.

Application Use of CSM

CSM includes an application programming interface (API) that allows users to obtain and return CSM buffers, change ownership of buffers, copy buffers and perform other functions related to CSM buffer management. Applications must be authorized to use CSM. The storage key for CSM buffers is key 6, fetch protected. Users set up and access data that resides in CSM buffers. These buffers are obtained from buffer pools that are identified by their buffer size and storage type according to Table 1.

Table 1. Buffer Pools in CSM

Storage Types	Buffer Sizes				
31-bit backed data space	**4 KB**	**16 KB**	**32 KB**	**60 KB**	**180KB**
64-bit backed data space	**4 KB**	**16 KB**	**32 KB**	**60 KB**	**180KB**
ECSA	**4 KB**	**16 KB**	**32 KB**	**60 KB**	**180KB**

Data space storage is a common area data space and is associated with the master scheduler address space. This association results in a data space that persists for the life of the system.

When an application obtains buffers from CSM, that application is considered the owner of those buffers. Based on application specifications, CSM can associate buffer responsibility with an address space or a task within an address space. Applications using CSM have the responsibility of returning owned buffers so that storage is available for other users.

Ownership can be transferred to another user. In this case, the new owner is responsible for the return of the buffers. CSM manages buffer reclamation during termination at the task or address space level based on ownership. For detailed information about buffer reclamation during termination, see “CSM Recovery for Normal and Abnormal Termination” on page 17.

For more information about buffer ownership, see “Ownership of Buffers” on page 8.

Installing, Defining, and Initializing CSM

CSM is shipped and installed with the VTAM product tape. However, many CSM functions are independent of VTAM. CSM storage limits and tuning parameters are defined in the CSM parmlib member, IVTPRM00. Refer to *z/OS Communications Server: SNA Migration* for information about the CSM parmlib member.

CSM is initialized by the first request to create a pool of buffers and remains active for the life of the system, independent of VTAM's status. The CREATE_POOL request could be issued by VTAM or a host application. Upon initialization, CSM reads the CSM parmlib member to determine storage limits and buffer pool related values. Once CSM is initialized, it persists for the life of the system.

Monitoring CSM

The use of CSM storage can be monitored by system operators by issuing the DISPLAY CSM command. CSM messages always start with the message prefix IVT. For a complete list of messages issued by CSM, refer to *z/OS Communications Server: SNA Messages*.

The following information is provided by the DISPLAY CSM command.

- Amount of storage allocated to each pool
- Amount of storage allocated to each user of the pool
- Cumulative storage allocated to each user across all pools
- Names of CSM data spaces

The DISPLAY CSM command can be used to identify a user of the pool that is consuming inordinate amounts of storage. This could occur in situations where an application fails to free buffers that it obtained from CSM. The report of storage allocated to a user is based on the user's *owner_ID* (OWNERID operand on the DISPLAY CSM command). CSM uses the application's address space identifier (ASID) as the OWNERID.

In some circumstances, the sum of the total of the storage allocated to all users of a pool may be greater than the total amount of storage allocated to a pool. This is due to multiple owners of a buffer resulting from the creation of shared instances using the IVTCSM REQUEST=ASSIGN_BUFFER macroinstruction. The information by OWNERID indicates the amount of storage that must be freed by the user to enable the storage to be returned to the buffer pool. CSM storage limits can be increased or decreased without requiring a re-IPL by issuing the MODIFY CSM command.

Some messages are issued by CSM when CSM storage limits are either at a critical level (90% of defined limits) or exceeded. In this case, the system operator can issue the MODIFY CSM command to increase the amount of fixed or ECSA storage available for CSM.

For more information about these two CSM commands, refer to *z/OS Communications Server: SNA Operation*.

The DISPLAY TRL command can be used to isolate a storage problem to a specific device. For more information, refer to *z/OS Communications Server: SNA Diagnosis Vol 1 Techniques and Procedures*. For more detail on the DISPLAY TRL command, refer to *z/OS Communications Server: SNA Operation*.

CSM storage information is also provided to the performance monitor interface (PMI). This information is equivalent to the information provided for the summary format of the DISPLAY CSM command. Refer to *z/OS Communications Server: SNA Customization* for more information.

Applications using the CSM API can also request information about the status of CSM storage by issuing the IVTCSM REQUEST=RESOURCE_STATS macroinstruction.

CSM Problem Diagnosis

You can obtain trace output of application requests to CSM by using the CSM option on the VTAM internal trace or, when VTAM is not active, the GTF trace facility.

- When VTAM is operational, the CSM trace facility is controlled using VIT. CSM writes records to the VIT using VTAM trace interfaces. The CSM trace option is used to control the generation of CSM trace records for both internal and external tracing.
- When VTAM is not operational, the VIT is not available and only external tracing is provided. The external trace is generated using the VTAM GTF event ID to write trace records directly to GTF in the same format as those recorded using VIT.

CSM tracing records the parameter list information that flows across the CSM interface and key internal events (such as pool expansion and contraction) for functions that manipulate buffer states. This allows you to trace and analyze the usage history of a buffer.

The number of trace records required to represent one IVTCSM request is variable based on the number of buffer operations requested. Since the information required to trace one IVTCSM request may span several CSM trace records, you can use the trace record flag field to determine whether additional trace records exist for a particular IVTCSM request. If the first bit in the trace record flag field is set on, then the trace record is continued. If VIT is not active, then multiple trace records for an IVTCSM request could be interspersed with trace records of IVTCSM requests from other users. A unique trace record number is provided to correlate the continuation trace records for each IVTCSM request.

For more information about tracing events over the CSM API, refer to *z/OS Communications Server: SNA Diagnosis Vol 1 Techniques and Procedures*.

Formatting CSM Dump Information

IPCS dump formatters provide the following services for displaying CSM information in a dump:

- Find and display CSM data structures
- Find and display CSM data structures for a buffer pool based on the size and source, ECSA or data space
- Search pool extents
- Find and display a buffer based on the input buffer token
- Find all buffers based on an input ownerid

All information is displayed with a header identifying the contents followed by hexadecimal contents only — no field identification is provided. Formatting options

that display information in buffers can provide only the requested data when the required storage areas are included in the dump.

Application Responsibilities for Using CSM

An application must be authorized to use the CSM API as described in *z/OS Communications Server: SNA Programming*. As system-authorized applications, all programs using CSM should be written to handle CSM storage in a responsible manner. Therefore, the application design should adhere to the following guidelines for requesting CSM services. Applications using CSM for VTAM's high performance data transfer (HPDT) service should refer to the guidelines described in the *z/OS Communications Server: SNA Programmer's LU 6.2 Guide*.

- Data in CSM storage should be modified only by the *original requester* of the buffers. The original requester is considered to be the application that obtained the storage using the IVTCSM REQUEST=GET_BUFFER macroinstruction. All other applications are considered to be *borrowers* of the buffers and must treat the data as read-only. There are possible exceptions to this rule. See "Responsibilities of Buffer Ownership" on page 9 for more details.
- All programs directly referencing CSM storage must do so in the proper storage key. All CSM storage is allocated in key 6.

  The IVTCSM REQUEST=COPY_DATA macroinstruction allows data to be copied into or out of CSM storage. The authorized invoker can be in any key. Use of this service may reduce the impact to the application due to storage key mismatches when CSM storage must be accessed.
- An application must not reference or use CSM storage after passing ownership of that storage to another user.
- An application that has accepted ownership of CSM storage is obligated to return the storage to CSM unless that application is passing the storage to another user. See "Ownership of Buffers" on page 8 for more information. Storage is returned to CSM on the IVTCSM REQUEST=FREE_BUFFER macroinstruction.
- Applications should use the IVTCSM REQUEST=RESOURCE_STATS macroinstruction to monitor the status of CSM storage. The application must be capable of reacting to storage constraint conditions that might jeopardize the application's or system's operation. See "Obtaining CSM Resource Statistics" on page 14 for more information. The RESOURCE_STATS request is described on page 73.
- In general, applications should request buffers from data space instead of ECSA to ensure that more virtual storage is available to all users of CSM. ECSA should be used only if there are special application requirements.
- The application's use of CSM should be documented so that the installation can adjust ECSA and fixed storage limits in the CSM parmlib member as necessary. This information should be available in application installation documentation so that necessary changes to the limits can be made prior to application installation.

Functions Provided by the CSM API

This section describes the functions that a user of CSM needs to be able to create and use storage pools. The IVTCSM macroinstruction provides the interface for applications issuing requests to CSM. The following shows the types of requests that can be issued using the IVTCSM macroinstruction:

- IVTCSM REQUEST=ASSIGN_BUFFER
- IVTCSM REQUEST=CHANGE_OWNER
- IVTCSM REQUEST=COPY_DATA

- IVTCSM REQUEST=CREATE_POOL
- IVTCSM REQUEST=DELETE_POOL
- IVTCSM REQUEST=DUMP_INFO
- IVTCSM REQUEST=FIX_BUFFER
- IVTCSM REQUEST=FREE_BUFFER
- IVTCSM REQUEST=GET_BUFFER
- IVTCSM REQUEST=PAGE_BUFFER
- IVTCSM REQUEST=RESOURCE_STATS

See “Chapter 2. Communications Storage Manager Macroinstructions” on page 19 for the complete description and syntax of each request. Table 2 contains a cross reference of IVTCSM requests and their valid input and output parameters.

Table 2. Valid Operands for IVTCSM Macroinstruction

REQUEST	CREATE POOL	DELETE POOL	GET BUFFER	FREE BUFFER	ASSIGN BUFFER	CHANGE OWNER	FIX BUFFER	PAGE BUFFER	COPY DATA	DUMP INFO	RESOURCE STATS
PLISTVER	Oi	Oi	Oi	Oi	Oi	Oi	Oi	Oi	Oi	Oi	Oi
BACK	Oi										
BUFLIST			Ri	Ri	Ri	Ri	Ri	Ri			
BUFNUM			Ri	Ri	Ri	Ri	Ri	Ri			
BUFSIZE	Ri										
BUFSOURC	Ri										
BUFTYPE			Ri		Oi			Ri			
CLEAR			Oi	Oi							
DS_INFO	Oo									Oo	
ERRBFLST			Oo	Oo	Oo	Oo	Oo	Oo			
EXPBUF	Ri										
FREERTN			Oi								
FREETO				Oi							
GAP			Oi	Oi	Oi	Oi	Oi	Oi			
INITBUF	Ri										
MF	Ri	Ri	Ri	Ri	Ri	Ri	Ri	Ri	Ri	Ri	Ri
MINFREE	Ri										
OWNERID			Oi		Oi	Oi					
PAD									Oi		

Table 2. Valid Operands for IVTCSM Macroinstruction (continued)

REQUEST	CREATE POOL	DELETE POOL	GET BUFFER	FREE BUFFER	ASSIGN BUFFER	CHANGE OWNER	FIX BUFFER	PAGE BUFFER	COPY DATA	DUMP INFO	RESOURCE STATS
POOLTOKN		Ri	Ri								
PADCHAR									Oi		
RETCODE	Oo	Oo	Oo	Oo	Oo	Oo	Oo	Oo	Oo	Oo	Oo
RETPTOKN	Oo										
RSNCODE	Oo	Oo	Oo	Oo	Oo	Oo	Oo	Oo	Oo	Oo	Oo
SKIPBUF				Oi		Oi					
SRCERRL									Oo		
SRCGAP									Oi		
SRCLIST									Ri		
SRCNUM									Ri		
STATAREA	Oo										Oo
TARGERRL									Oo		
TARGGAP									Oi		
TARGLIST									Ri		
TARGNUM									Ri		
TASKID			Oi		Oi	Oi					
THREAD			Oi	Oi	Oi	Oi	Oi	Oi	Oi		
UTILRTN			Oi	Oi	Oi	Oi	Oi	Oi	Oi		
WAIT			Oi				Oi				
Key: **R**=Required **O**=Optional **i**=input **o**=output											

Buffer Pool Creation and Registration

Upon application request, CSM can create buffer pools based on the size and types listed in Table 1 on page 1. Altogether, a total of 15 CSM buffer pools can be created, one for each storage type and buffer size.

The structures to maintain the storage pools are created as a result of the first IVTCSM REQUEST=CREATE_POOL macroinstruction issued by a user of CSM (this could be VTAM or a host application). The pool may or may not already exist. In either case, the application that issues the CREATE_POOL request is a

registered user and can obtain buffers from that pool. CSM returns a token in the RETPTOKN parameter that the application uses on subsequent requests for buffers from that pool.

An application can specify buffer pool tuning parameters on the CREATE_POOL request. See “CSM Buffer Pool Expansion and Contraction” on page 14 for more information.

Where possible, it is recommended that programs use CSM data space instead of ECSA. Furthermore, use of 64-bit backed CSM data space is preferred to 31-bit backed CSM data space. Using data space instead of ECSA and 64-bit backed data space instead of 31-bit backed data space benefits overall system performance.

Requesting Storage from CSM

Before an application can retrieve storage from CSM, it must be registered as a user of a CSM buffer pool as described in “Buffer Pool Creation and Registration” on page 6. The CSM buffer pools available are summarized in Table 1 on page 1. CSM returns a pool token in the RETPTOKN parameter that the application uses on subsequent requests for buffers from that pool.

Applications obtain buffers from CSM by specifying the token of the pool with which they are registered and the number of buffers on the IVTCSM REQUEST=GET_BUFFER macroinstruction. CSM allocates the requested number of buffers from that pool to the application. CSM returns a buffer list. Each entry in the buffer list contains a token and other information that the application and CSM use to reference the buffers. See “CSM Buffer Lists” for more information about buffer lists in CSM.

An application can obtain buffers from CSM as they are needed or manage its own pool of buffers to be retained for multiple uses. By default, buffers are returned to CSM when the current owner issues the IVTCSM REQUEST=FREE_BUFFER macroinstruction. An application designed to manage its own pool of buffers uses a buffer return exit routine that assumes control of the buffers once they are freed by a user.

See “Buffer Return Exit Routine” on page 16 for more information about the buffer return exit routine that can receive control after buffers are released by a FREE_BUFFER request.

GET_BUFFER requests that exceed the storage available in CSM are rejected. Users of CSM should monitor CSM storage use and take action to prevent critical shortages that might jeopardize the application’s or system’s operation. See “Obtaining CSM Resource Statistics” on page 14 for more information.

CSM Buffer Lists

The following requests require the application to provide the address of a buffer list:

- IVTCSM REQUEST=ASSIGN_BUFFER
- IVTCSM REQUEST=CHANGE_OWNER
- IVTCSM REQUEST=FIX_BUFFER
- IVTCSM REQUEST=FREE_BUFFER
- IVTCSM REQUEST=GET_BUFFER
- IVTCSM REQUEST=PAGE_BUFFER

CSM builds a buffer list in the area provided on the BUFLIST parameter of the GET_BUFFER request. The buffer list contains, among other information, a token used by CSM to manage each buffer. The format of the CSM buffer list is described in “CSM Buffer List Entry (IVTBUFL)” on page 79. The IVTBUFL DSECT maps an entry in the CSM buffer list, which can be indicated by the BUFLIST, SRCLIST or TARGLIST parameters on the IVTCSM macroinstruction.

Each buffer list entry may be contiguous to the previous entry with the number of entries in the list defined by the BUFNUM operand on the request. The GAP parameter may be used to separate entries.

Fixed Buffers Versus Pageable Buffers

An application can specify buffers that are in one of the following formats:

- Guaranteed to be fixed (BUFTYPE=FIXED)
- Guaranteed to be pageable (BUFTYPE=PAGEABLE)
- Eligible to be made pageable (BUFTYPE=PAGEELIG)

Guaranteeing That a Buffer Is Fixed

Some processes require buffers to be fixed into real storage. An application can specify fixed buffers (BUFTYPE=FIXED parameter) on the GET_BUFFER and ASSIGN_BUFFER requests. Availability of fixed buffers is limited by the system definitions in the installation’s CSM parmlib member. The application can obtain pageable buffers when fixed buffers are unavailable and make the buffers fixed at a later time using the FIX_BUFFER request.

Making a Buffer Eligible to Be Paged

An application can classify buffers as *eligible to be paged* by specifying BUFTYPE=PAGEELIG on the GET_BUFFER, ASSIGN_BUFFER, and PAGE_BUFFER requests. Eligible to be paged is a status maintained by CSM. The actual system state of a buffer with this status can be either fixed or pageable. CSM internally monitors the level of fixed storage usage. The buffers may remain fixed unless CSM determines that the storage should be made pageable. This avoids the overhead of unnecessary fixing and freeing of storage from a system perspective.

This function may be used to avoid consuming fixed storage for data that is being held in a buffer for possible use at a later time. If an eligible to be paged buffer must later be fixed, the application must issue the FIX_BUFFER request.

Making a Buffer Guaranteed to Be Pageable

An application can classify buffers as *guaranteed to be made pageable* by specifying BUFTYPE=PAGEABLE on the GET_BUFFER and PAGE_BUFFER requests. This function can be issued only for a buffer consisting of one image. For information about how multiple images of a buffer can be created, see “IVTCSM REQUEST=ASSIGN_BUFFER” on page 22.

Ownership of Buffers

CSM uses the address space identifier (ASID) as the basis for the OWNERID value. OWNERID can be specified on the following requests:

- IVTCSM REQUEST=ASSIGN_BUFFER
- IVTCSM REQUEST=GET_BUFFER
- IVTCSM REQUEST=CHANGE_OWNER

The owner is the application responsible for returning buffers to CSM using the IVTCSM REQUEST=FREE_BUFFER macroinstruction. CSM assigns initial buffer

ownership to the original requester of the buffers. This can be overridden by specifying another user's ASID as the OWNERID on the IVTCSM REQUEST=GET_BUFFER macroinstruction. Ownership of CSM buffers can be passed to another user by issuing an IVTCSM REQUEST=CHANGE_OWNER macroinstruction.

Ownership of a buffer can be associated to a task by specifying a TCB address on the TASKID parameter on the following requests:

- IVTCSM REQUEST=ASSIGN_BUFFER
- IVTCSM REQUEST=GET_BUFFER
- IVTCSM REQUEST=CHANGE_OWNER

If TASKID is not specified, buffer ownership is associated with the ASID.

Ownership of a buffer that has an associated buffer return exit is not actually changed due to an IVTCSM REQUEST=CHANGE_OWNER macroinstruction; the buffer is actually borrowed. The original owner of the buffer will be maintained so that ownership is restored when the buffer is freed. However, if the original owner's address space terminates before the buffer return exit is invoked, the current borrower, if one exists, becomes the new owner. If the buffer is not being borrowed, it is returned to CSM.

Responsibilities of Buffer Ownership

When an application obtains buffers from CSM on a IVTCSM REQUEST=GET_BUFFER macroinstruction, that application is considered to be the *original requester* of that storage. Ownership responsibility entails either ultimately freeing the storage (on an IVTCSM REQUEST=FREE_BUFFER macroinstruction) or changing ownership to another user. Failure to return the storage ultimately creates CSM storage constraint conditions.

The original requester of the storage can specify a buffer return exit routine at storage allocation time and is entitled to the return of storage without modification. Therefore, the receiving application should consider this as *read-only* storage and should not modify the contents.

It is possible that applications, if written as a cooperative set of processes, could determine that it is acceptable to modify the data if the original application does not require the original data returned unmodified. The caution here is that applications written in this manner must be able to guarantee that the original requester of the storage is one of the cooperative applications. If the storage allocation source is unknown to the receiver, the read-only requirement applies.

Changing Ownership of a Buffer

The CHANGE_OWNER request can be issued by any user that can address the buffers by using the buffer tokens provided by CSM. This includes the following scenarios:

- Application A passes buffer tokens to application B. Application B issues the IVTCSM REQUEST=CHANGE_OWNER macroinstruction.
- Application A uses the IVTCSM REQUEST=CHANGE_OWNER macroinstruction to pass ownership of the buffers to application B.

After an ownership change, the former owner of the buffers must not address the buffers except when the former owner has specified a buffer return exit. In this case, the application must not address the buffers until its exit routine is scheduled

by CSM. The exit routine is scheduled when the current owner of the buffers issues the IVTCSM REQUEST=FREE_BUFFER macroinstruction.

High Performance Data Transfer — An Example of How Ownership is Changed: The HPDT interface demonstrates how two CSM users perform ownership change. On an HPDT send, the application passes the buffer tokens to VTAM in an extended buffer list (XBUFLST) on the send request. VTAM performs the CHANGE_OWNER request. If an error occurs, VTAM notifies the application so that the application can recover buffers that were not accepted. On the receive side, VTAM passes the buffer list to the application and issues the CHANGE_OWNER request.

Storage Return

An application uses the IVTCSM REQUEST=FREE_BUFFER macroinstruction to release buffers back to CSM. CSM returns the buffers back to the original requester if all of the following are true:

- The original requester specified a buffer return exit address on the FREERTN parameter of the IVTCSM REQUEST=GET_BUFFER macroinstruction.
- The original requester is active at the time the IVTCSM REQUEST=FREE_BUFFER macroinstruction is issued.
- The application issuing IVTCSM REQUEST=FREE_BUFFER does not specify FREETO=CSM. This parameter is intended for situations where the original requester needs to return buffers without invoking its own buffer return exit.

The requester may optionally specify that the buffer is to be cleared when issuing the FREE_BUFFER request. See “Clearing Data from Buffers” for more information.

All storage manager GET_BUFFER and ASSIGN_BUFFER requests must have a corresponding FREE_BUFFER request before the buffer is considered available for reallocation by CSM or before a buffer return exit is invoked for a buffer obtained specifying a user free routine. This is necessary to ensure that all users have finished using the buffer.

Clearing Data from Buffers

An application can instruct CSM to clear data from buffers that are returned to the buffer pool by specifying CLEAR=YES on the following macroinstructions:

- IVTCSM REQUEST=FREE_BUFFER
- IVTCSM REQUEST=GET_BUFFER

This provides for secure data to be passed to another user such that any residual data is eliminated when that buffer has returned to the pool.

Notes:

1. The CLEAR=YES specification on a IVTCSM REQUEST=GET_BUFFER macroinstruction overrides a CLEAR=NO specification on a IVTCSM REQUEST=FREE_BUFFER macroinstruction.
2. Specifying CLEAR=YES will not cause a buffer to be cleared that is returned to an application’s buffer return exit routine. However, if CLEAR=YES is specified, the buffer is cleared in the event that it is returned to the storage pool.

Removing Registration from a Pool

Since each pool may have multiple users, a storage pool is not deleted until all buffers have been returned by all users and DELETE_POOL requests have been

received for each corresponding CREATE_POOL request. To deregister as the user of the pool, the application issues the IVTCSM REQUEST=DELETE_POOL macroinstruction.

Copying Data to or from a CSM Buffer

Applications can use the IVTCSM REQUEST=COPY_DATA macroinstruction to copy data to or from a CSM buffer or a user data area. The authorized invoker can be in any key. Use of this request may reduce the impact to the application due to storage key mismatches when CSM storage must be accessed. It also assist users of CSM data space buffers by isolating the application from the addressing method used to access a data space.

The IVTCSM REQUEST=COPY_DATA macroinstruction allows multiple source buffers to be copied to or from one or multiple target buffers. The source buffers are copied to the target buffers using the source and target buffer lengths to pack data or span data across the target buffers as required.

If the cumulative length of the source buffers is greater than the cumulative length of the target buffers, truncation of the source data occurs. The application can specify a character on the PADCHAR input parameter to pad the target buffers when the cumulative length of the source buffers is less than the cumulative length of the target buffers.

On the COPY_DATA request the application must supply a source buffer list and a target buffer list, as shown in Figure 1 on page 12. The number of entries in each list are not required to be equal. Within each list, entries may or may not represent a CSM buffer. The value of the BUFL_SOURCE field dictates whether the entry represents a CSM buffer. For entries representing CSM buffers, the address that is the source or target of the copy is provided by the requester and is not required to be the actual start address of the CSM buffer. CSM validates that the specified address and length corresponds to a storage area that is within the bounds of the CSM buffer. This validation is based on the size of the buffer as determined at the time the buffer pool was created.

A user data area that is involved in the copy data operation may be optionally ALET-qualified to allow this area to reside in a data space.

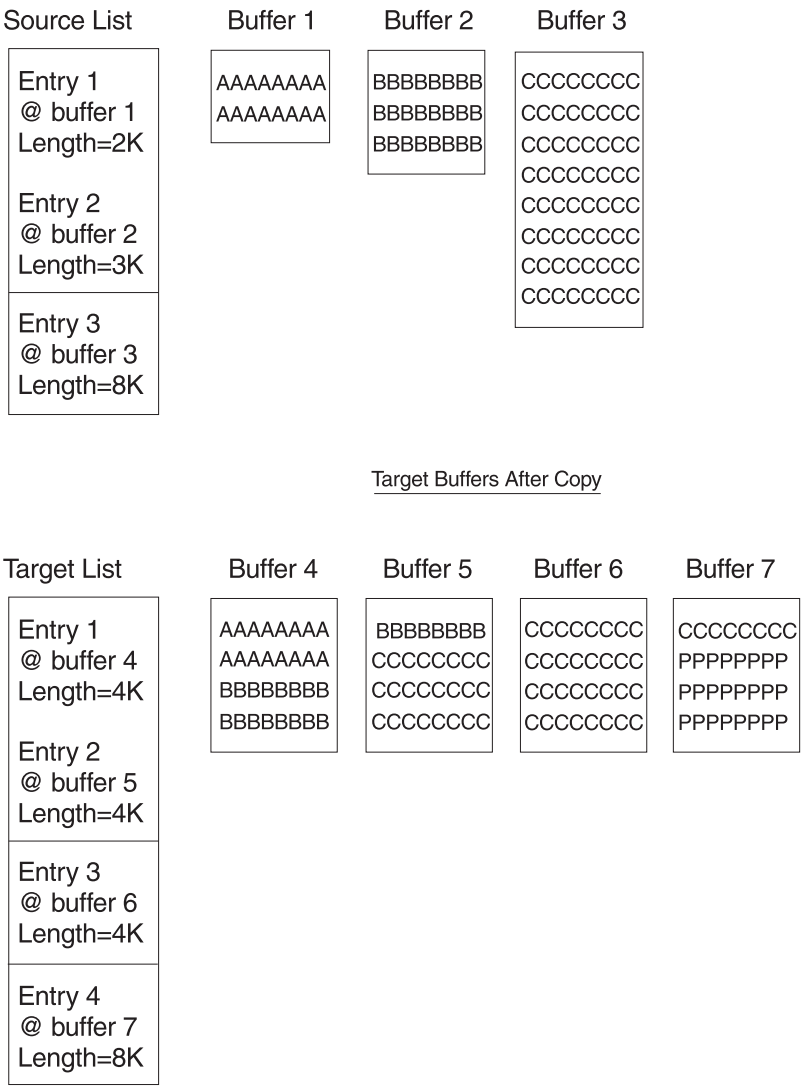


Figure 1. Example of Copy Data Buffer List and Copy Results

Sharing Buffers Among Multiple Users

The IVTCSM REQUEST=ASSIGN_BUFFER macroinstruction provides the capability for a buffer to be concurrently shared between multiple users. A logical instance of the buffer is created for each user. A new physical copy of the buffer is not created. This function is provided to allow specific areas of the buffer to be allocated to different owners. This function could be used to allow multiple users to have read access to the same data. No serialization is provided to prevent concurrent updates by users.

A new buffer token is returned representing the new instance of the buffer. The buffer token is the means by which this new instance of the buffer is known to CSM. This token must be used with all other requests to CSM for the associated buffer instance.

On the ASSIGN_BUFFER request, multiple shared instances of a single buffer can be created by passing a multiple entry buffer list with the same buffer token in each entry.

A request to create a new image of a buffer that is in a guaranteed to be pageable state is not permitted. The reason for this restriction is to guarantee that a user of a buffer that has multiple images can successfully issue a FIX_BUFFER request if necessary. Fixing a buffer requires that the entire buffer be fixed regardless of the fact that the user may only be interested in a piece of the buffer. The application can specify the BUFTYPE parameter as described in “Fixed Buffers Versus Pageable Buffers” on page 8.

Obtaining CSM Dumping Information

Including CSM storagein a dump may be necessary to debug problems associated with the application’s use of CSM buffers. An application can use the following information to include CSM storage in a dump.

- Dumping area containing CSM data structures, pool structures, and buffer headers:
  - Location extended common service area (ECSA)
  - Subpool 241
  - Key 6

  These areas can be included in a user dump by specifying the subpool and key on the invocation of the SDUMPX macroinstruction.
- Dumping buffers in an ECSA buffer pool:
  - Location Extended CSA (ECSA)
  - Subpools 231
  - Key 6

  The ECSA buffer pool can be included in a user dump by specifying the subpool and key on the invocation of the SDUMPX macroinstruction.
- Dumping buffers in a data space buffer pool
  - Location common area data space (CADS) owned by the master address space
  - Key 6
  - Data space address range 4KB-2Gigabyte
  - Data space STOKENs and ALETs provided by IVTCSM REQUEST=DUMP_INFO.

It is recommended that applications include the areas containing CSM data structures by specifying the subpools and key to reduce the amount of data included in the dump. Selective dumping is most important when dumping data in a CSM data space rather than dumping the entire 2 gigabyte contents.

For ease of dumping CSM buffers during testing, an application can use ECSA buffers since this area can be included in a dump using the subpool and key. Once the application is debugged, data space buffers could be used for the production application.

An application can request the location of information required to obtain CSM data spaceinformation in a dump on the following macroinstructions:
- IVTCSM REQUEST=CREATE_POOL
- IVTCSM REQUEST=DUMP_INFO

The application can specify the address of an area on the DS_INFO parameter where CSM will place the address of the area containing the CSM data space information. This information is mapped by the IVTDATSP DSECT. (See “CSM Data Space Information (IVTDATSP)” on page 80.) The application can request the information during initialization processing and use the information throughout normal processing.

Dumping the entire data space requires a long processing time and a large amount of external recording media. You may wish to limit the amount of area dumped based on address ranges within the data space believed to be pertinent to the user. For example, using the ALETs returned by the IVTCSM REQUEST=DUMP_INFO macroinstruction, you can determine whether, at the time of abend, any access registers (AR) contain an ALET associated with a CSM data space. If an AR contains an ALET of a CSM data space and the program was executing in AR mode at the time of the failure, you may want to dump a limited number of bytes of the data surrounding the address represented by the general register (GR) and AR pair.

Obtaining CSM Resource Statistics

An application can request the address of information required to monitor usage of CSM resources such as ECSA, data space and fixed storage. The address of this information is returned on the STATAREA parameter when the following macroinstructions are issued:

- IVTCSM REQUEST=CREATE_POOL
- IVTCSM REQUEST=RESOURCE_STATS

The application can request the address of the resource statistics area during initialization processing and can reference this area to obtain resource statistics throughout normal processing.

For each resource type, two bits are defined. One to indicate the usage of the resource is constrained and one to indicate the usage is critical. If neither bit is set, the usage of the resource is considered to be normal.

Critical
Indicates that CSM storage usage is at 90% of defined limits or higher.

Constrained
Indicates that CSM storage usage is at 85% of defined limits and is approaching the critical level. If this bit is set, the application should determine if the critical bit is also set.

GET_BUFFER requests that exceed the storage available in CSM are rejected. Users of CSM should monitor CSM storage use and take action to prevent critical shortages that might jeopardize the application’s or system’s operation. Possible user actions might include freeing buffers that are no longer needed, selecting a different storage source for buffer pools, or limiting usage of fixed storage.

The CSM resource statistics information is mapped by the IVTSTATA DSECT. (See “CSM Resource Status Area (IVTSTATA)” on page 81.)

CSM Buffer Pool Expansion and Contraction

CSM buffer pools can be expanded or contracted based on the MINFREE, INITBUF, and EXPBUF specifications in the CSM parmlib member, IVTPRM00. If these values are not specified in the CSM parmlib member, or if CSM cannot read

that parmlib member during initialization, CSM uses the values specified by the application on the IVTCSM REQUEST=CREATE_POOL macroinstruction. If buffer pool tuning specifications are not available from either the CSM parmlib member or application request, then system defaults are used. This section describes how expansion and contraction of CSM buffer pools is performed based on application settings. For more information about the CSM parmlib member, refer to *z/OS Communications Server: SNA Migration*.

Number of Buffers When Buffer Pool Is Created Using Application Settings

CSM creates a pool of buffers when the first CREATE_POOL request is received. The initial number of buffers created in that pool is specified by the INITBUF parameter. INITBUF is required on the CREATE_POOL request.

The range for INITBUF is 0 – 9999. If 0 is specified, only the base pool structure is created. In this case, the pool will be expanded on the first GET_BUFFER request based on the EXPBUF parameter value. If a value is specified that is outside of the range for INITBUF, one of the following values is used, depending on the size of the buffers in the pool.

Pool size	Initial number of buffers (INITBUF)
4096	64
16384	32
32768	16
61440	16
184320	2

CSM Buffer Pool Expansion Using Application Settings

CSM buffer pools are expanded as needed to maintain the specified number of free buffers in the pool. The number of free buffers maintained is determined by the highest MINFREE (minimum free buffer) specifications by all users of a pool.

CSM buffer pools are expanded by the maximum of the EXPBUF (expand buffers) specifications by all users of a pool. The storage pool will be expanded if the number of free buffers falls below MINFREE.

The pool is managed in extents. Expansion consists of creating a new extent with the number of buffers as determined by the EXPBUF parameters. The expansion of the pool is scheduled as a side process in order to avoid excessive pathlength on a IVTCSM REQUEST=GET_BUFFER macroinstruction due to inline pool expansion. In the event that pool expansion must complete to satisfy a request for buffers, the application has the option of waiting for pool expansion to complete by specifying WAIT=EXPAND or WAIT=YES on the IVTCSM REQUEST=GET_BUFFER macroinstruction.

MINFREE Parameter: MINFREE is required on the CREATE_POOL request. The range for MINFREE is 0–9999. If a value is specified that is outside of the range for MINFREE, one of the following values is used, depending on the size of the buffers in the pool.

Pool size	Minimum buffers that are free (MINFREE)
4096	8
16384	4

Pool size	Minimum buffers that are free (MINFREE)
32768	2
61440	2
184320	1

EXPBUF Parameter: EXPBUF is required on the CREATE_POOL request. The valid range for EXPBUF depends on the size of the buffers in the pool. If a value is specified that is outside of the range for EXPBUF, one of the following values is used.

Pool size	Valid range	Number of buffers to expand pool (EXPBUF)
4096	1-256	16
16384	1-256	8
32768	1-128	4
61440	1-68	4
184320	1-22	2

CSM Buffer Pool Contraction Using Application Settings

CSM buffer pools contract as necessary to prevent the pools from consuming system resources permanently as the result of usage peaks. Contraction occurs when the number of buffers that are not in use exceeds one of the following values, whichever is higher:

- INITBUF
- MINFREE + 2(EXPBUF)

The pool will not contract below the level specified on the INITBUF parameter.

Buffer Return Exit Routine

An application can manage its own pool of buffers to be retained for multiple uses by coding a buffer return exit routine that assumes control of the buffers once they are freed by a user. By default, buffers are returned to CSM when the current owner issues the IVTCSM REQUEST=FREE_BUFFER macroinstruction. An application that provides the address of its buffer return exit on the FREERTN parameter of the IVTCSM REQUEST=GET_BUFFER macroinstruction will receive ownership when the buffers are freed by another user.

The buffer return exit routine is scheduled to execute in the address space which owns the buffer to ensure that the owning environment still exists.

The buffer return exit routine is called by a CSM routine that receives control from the SRB scheduler. The CSM routine passes the address of the parameter list to the buffer return exit routine in register 1. To map the passed parameter list, the buffer return exit routine should include a DSECT that issues the LIST form of the IVTFREE macro as coded in the following example:

```
name    DSECT
        IVTFREE MF=(L,listaddr)
```

The parameter list contains the address of the buffer list and the number of buffer entries in the list. The following is a sample output of the LIST form of the IVTFREE macroinstruction with a *listaddr* value of FREPL:

```
         FREPL    DS    0D                ++ IVTFREE PARM LIST
         FREPL_XVERSION DS XL1            ++ INPUT XVERSION
         FREPL_XRSVFREE1 DS CL03          ++ RESERVED  XRSVFREE1
         FREPL_XBUFLIST DS A              ++   XBUFLIST
         FREPL_XBUFNUM DS F               ++   XBUFNUM
0000C    FREPLL   EQU   *-FREPL           ++ LENGTH OF PLIST
```

Each buffer list entry is mapped by the IVTBUFL DSECT. The application can examine the tokens in each entry to correlate them with the buffers referenced by the original GET_BUFFER request. When a buffer return exit is driven, the pageability of the buffer may have changed. The original buffer address, token, and length remains the same.

After regaining ownership of the buffers, the application can determine whether to release the buffers back to CSM using the FREE_BUFFER request. To prevent looping, the application must not specify FREETO=USER on the FREE_BUFFER request, which would reschedule the application's buffer return exit. To return the buffers back to CSM, the buffer return exit should specify FREETO=CSM on the FREE_BUFFER request.

CSM Recovery for Normal and Abnormal Termination

For normal or abnormal termination, CSM users free all owned buffers prior to completing termination processing. However, this may not always be possible for abnormal termination.

In order to ensure that buffers are not lost due to normal or abnormal termination, CSM uses the following resource termination managers to reclaim buffers that are owned by the terminating environment.

- Job Step Task Resource Termination Manager:

  Job Step Task cleanup is performed if task is not an MVS™ started task (for example, batch).
- Memory Resource Termination Manager:

  Memory cleanup is performed whenever address space memory termination occurs.

The resource managers will receive control from recovery termination management (RTM) during job step task and memory termination processing, determine if any of the allocated buffers are owned by the terminating address space, and as appropriate free the buffers back to the buffer pool.

Additionally, CSM allows the user to associate buffers to a task. Buffers that are task associated will be reclaimed by CSM at the end of the specified task only if the task abnormally terminates. The user of the buffer is responsible for ensuring the buffers are freed during normal termination.

If a user of CSM desires to provide recovery mechanisms to free buffers at events other than those provided by CSM, the user can create ESTAE/FRR recovery routines to recover at a program level or RESMGR to create a resource manager to recover at a task termination event not provided by CSM. When performing this type of processing, users must ensure that their application processing is properly synchronized with any applications to which they are passing buffers.

Chapter 2. Communications Storage Manager Macroinstructions

This chapter describes all varieties of the IVTCSM macroinstruction. Separate descriptions are included for each value of the REQUEST parameter. Macroinstruction descriptions are arranged alphabetically.

How the Macroinstructions Are Described

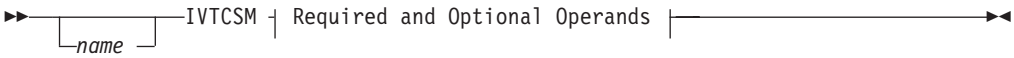
Each macroinstruction description includes:

- Purpose of the macroinstruction
- General comments about the use of the macroinstruction
- The format or syntax of the macroinstruction and all parameters
- A description of each parameter
- Return and reason codes that can be returned for the macroinstruction

Syntax Descriptions

The syntax for each macroinstruction is described using the following format:

main diagram



If you are not familiar with this type of syntax diagram, see “Appendix C. How to Read a Syntax Diagram” on page 83.

The macroinstructions are coded in the same format as assembler instructions, using name, operation, and operand fields. Refer to the *IBM High Level Assembler Language Reference for MVS and VM* for complete information on coding guidelines.

Operand Descriptions

The name and description of each operand follows the syntax diagram. Each operand description begins with an explanation of the operand’s function.

Parameter values that are shown in uppercase bold type must be coded as they appear in the syntax. For parameter values that are shown in lowercase italic type, specify a location that is to be the source of input data or the target of output data. The location must be defined in a manner that is consistent with the indicated data type. If you wish to pass the storage address in general purpose register (2)-(12), code a valid expression for the register within parentheses. Otherwise, code an expression that is valid as a storage operand on RS-type instructions.

Exception: If a register is specified for RETCODE or RSNCODE, the output is loaded straight into the register.

To reference the parameter list within your program, use the list form of the macro, `MF=(L,...)`, to define the parameter list structure. The *listaddr* value you specify becomes the name by which you can reference the structure in your program. For

example, the assembler instruction LA 1,*listaddr* puts the parameter list address in register 1. The name of the field associated with a parmlist operand *opername* is *listaddr*_X*opername*. If macroinstruction-defined values are associated with *opername*, the constant for a particular value, *valuenam*, is *listaddr*_X*opername*_*valuenam*.

Note: The PLISTVER operand is an exception to the rule. To reference its field, substitute *opername* with the keyword **VERSION**. Also, the macro does not define constants for any of the allowable PLISTVER values.

Completion Information

All of the executable macroinstructions pass return codes in registers, and most indicate status information in various control block fields when they are posted complete. For all macroinstructions that invoke CSM, the application can examine return codes in register 15 and reason codes in register 0. Descriptions of this status information can be found at the end of the macroinstruction description.

Computing Environment for the CSM Application Programming Interface

This section describes the environment in which the IVTCSM macro is issued.

Environment

The requirements for the caller are as follows:

Minimum authorization:	Supervisor state. Any PSW key.
Dispatchable unit mode:	Task or SRB. Exception: CREATE_POOL and DELETE_POOL requests must be issued in Task Mode.
Cross memory mode:	Any PASN, any HASN, any SASN. CREATE_POOL and DELETE_POOL requests are PASN=HASN=SASN only.
AMODE:	31-bit.
ASC mode:	Primary.
Interrupt status:	Enabled for I/O and external interrupts.
Locks:	No locks may be held.
Control parameters:	Control parameters must be in the primary address space.

Programming Requirements

The user must provide a recovery environment if one is necessary during the invocation of the IVTCSM Service, as the service does not provide a recovery environment during all its functions.

The service does provide for buffer reclamation at end-of-memory, end-of-Job-Step-Task, and, optionally, at abnormal end-of-task. See “CSM Recovery for Normal and Abnormal Termination” on page 17 for more information.

Restrictions

This section describes the restrictions on the caller.

- Do not use MVS page-fix services directly for buffers provided by this service. Establish the BUFTYPE attribute of these buffers using CSM service requests.
- Do not issue ALESERV delete for an ALET returned from CSM.

Input Register Information

Before issuing this macro, the caller must ensure that register 13 contains the address of a 72-byte standard save area in the primary address space.

Output Register Information

When control returns to the caller, the general purpose registers contain:

Register	Contents
0	Error reason code from the requested function
1	Used as work register by the system
2-13	Unchanged
14	Used as work register by the system
15	Return code from requested function

IVTCSM REQUEST=ASSIGN_BUFFER

Purpose

This macroinstruction allows an application to request that a buffer be logically assigned to another owner (shared) in order to make multiple owners of a buffer.

Usage

This macroinstruction allows a buffer to be concurrently shared between multiple users. A logical instance of the buffer is created for each user. A new physical copy of the buffer is not created. This macroinstruction can be used to allow specific areas of the buffer to be allocated to different owners and to allow multiple users to have read access to the same data. No serialization is provided to prevent concurrent updates by users.

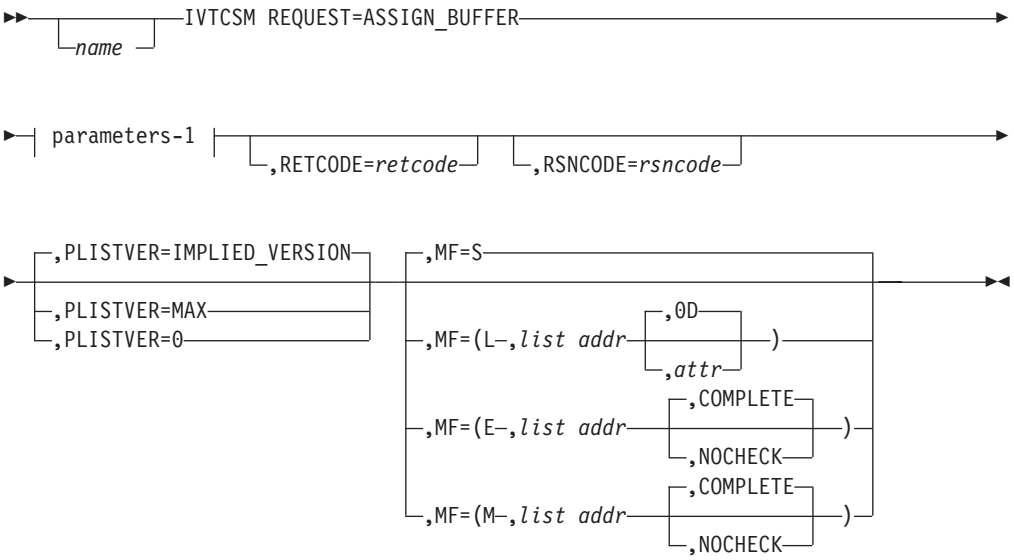
The ownership of the new instance of the buffer is assigned to the requesting application's ASID by default. Ownership of a new instance of the buffer may be optionally qualified by specifying a TASKID on the macroinstruction. The TASKID is a TCB address with the default being no task association.

On completion of this macroinstruction, a new buffer token is returned representing the new instance of the buffer. The buffer token is the means by which this new instance of the buffer is known to CSM. This token must be used with all other requests to CSM for the associated buffer instance.

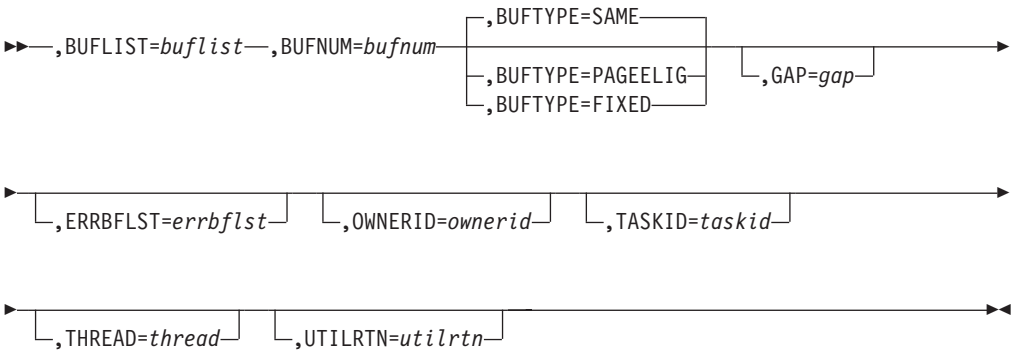
Multiple shared instances of a single buffer can be created by passing a multiple entry buffer list with the same buffer token in each entry.

Syntax

main diagram



parameters-1



Parameters

The parameters are explained as follows:

name
: An optional symbol, starting in column 1, that is the name on the IVTCSM macro invocation. The name must conform to the rules for an ordinary assembler language symbol.

,BUFLIST=*buflist*
: A required input parameter of an area containing a list of buffer entries. The number of entries in the list is provided by BUFNUM. An entry in the buffer list is mapped by IVTBUFL. Some of the fields defined in IVTBUFL are required as input and some are set by CSM as output fields. Note that the buffer token representing the new buffer image is returned in the BUFL_TOKEN field as output.

  The following fields in IVTBUFL are required as input for this request.
  - BUFL_VERSION
  - BUFL_TOKEN

  The following fields in IVTBUFL are returned as output by CSM for this request.
  - BUFL_TYPE
  - BUFL_TOKEN

  To code: Specify the RS-type address, or address in register (2)-(12), of a field.

,BUFNUM=*bufnum*
: A required input parameter, specifying the number of buffers to be logically assigned.

  To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,BUFTYPE=
: An optional parameter, specifying whether the buffer images are guaranteed to be fixed, eligible to be made pageable or have the same pageable state as the buffers represented by the input token. The default is BUFTYPE=SAME.

  ,BUFTYPE=SAME
  : Indicates that the pageable state of the buffer images will be the same as the buffers represented by the input token.

  ,BUFTYPE=PAGEELIG
  : Indicates that the buffer images are eligible to be made pageable.

  ,BUFTYPE=FIXED
  : Indicates that buffer images are guaranteed to be fixed.

,ERRBFLST=*errbflst*

An optional output parameter, specifying the number of the last buffer entry that was successfully processed when an error is detected during processing of the macroinstruction.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,GAP=*gap*

An optional input parameter, specifying the number of bytes used to separate buffer entries. This parameter allows the buffer entries to be in discontiguous storage. If GAP is not specified, buffer entries are contiguous.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,MF=

An optional input parameter that specifies the macro form.

Use MF=S to specify the standard form of the macro, which builds an inline parameter list and generates the macro invocation to transfer control to the service. MF=S is the default.

Use MF=L to specify the list form of the macro. Use the list form together with the execute form of the macro for applications that require reentrant code. The list form defines an area of storage that the execute form uses to store the parameters. Only the PLISTVER parameter may be coded with the list form of the macro.

Use MF=E to specify the execute form of the macro. Use the execute form together with the list form of the macro for applications that require reentrant code. The execute form of the macro stores the parameters into the storage area defined by the list form, and generates the macro invocation to transfer control to the service.

Use MF=M together with the list and execute forms of the macro for service routines that need to provide different options according to user-provided input. Use the list form to define a storage area; use the modify form to set the appropriate options; then use the execute form to call the service.

,*list addr*

The name of a storage area to contain the parameters. For MF=S, MF=E, and MF=M, this can be an RS-type address or an address in register (1)-(12).

,*attr*

An optional 1- to 60-character input string that you use to force boundary alignment of the parameter list. Use a value of 0F to force the parameter list to a word boundary, or 0D to force the parameter list to a doubleword boundary. If you do not code *attr*, the system provides a value of 0D.

,COMPLETE

Specifies that the system is to check for required parameters and supply defaults for omitted optional parameters.

,NOCHECK

Specifies that the system is not to check for required parameters and is not to supply defaults for omitted optional parameters.

IBM recommends that you use the modify and execute forms of IVTCSM in the following order:

1. Use IVTCSM ...MF=(M,list-addr,COMPLETE) specifying appropriate parameters, including all required ones.
2. Use IVTCSM ...MF=(M,list-addr,NOCHECK), specifying the parameters that you want to change.
3. Use IVTCSM ...MF=(E,list-addr,NOCHECK), to execute the macro.

,OWNERID=*ownerid*

An optional input parameter, specifying the owner to which the buffer image is to be logically assigned. If not coded, the ASID of the issuing application is assigned as the OWNERID.

To code: Specify the RS-type address, or address in register (2)-(12), of a halfword field.

,PLISTVER=

An optional input parameter that specifies the version of the macro. PLISTVER determines which parameter list the system generates. PLISTVER is an optional input parameter on all forms of the macro, including the list form. When using PLISTVER, specify it on all macro forms used for a request and with the same value on all of the macro forms. The values are:

- **IMPLIED_VERSION**, which is the lowest version that allows all parameters specified on the request to be processed. If you omit the PLISTVER parameter, IMPLIED_VERSION is the default.
- **MAX**, if you want the parameter list to be the largest size currently possible. This size might grow from release to release and affect the amount of storage that your program needs.

  If you can tolerate the size change, IBM recommends that you always specify PLISTVER=MAX on the list form of the macro. Specifying MAX ensures that the list-form parameter list is always long enough to hold all the parameters you might specify on the execute form; in this way, MAX ensures that the parameter list does not overwrite nearby storage.
- **0**, if you use the currently available parameters.

To code: Specify one of the following:
- IMPLIED_VERSION
- MAX
- A decimal value of 0

,RETCODE=*retcode*

An optional output parameter into which the return code is to be copied from GPR 15.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,RSNCODE=*rsncode*

An optional output parameter into which the reason code is to be copied from GPR 0.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,TASKID=*taskid*

An optional input parameter that is to contain the address of a TCB. This further qualifies the ownership of a buffer to a specific task. If TASKID is not specified, the buffer is not associated with a task but is instead associated with the issuing application's ASID.

To code: Specify the RS-type address, or address in register (2)-(12), of a pointer field.

,THREAD=*thread*

An optional input parameter, specifying a unique identifier that is placed in the CSM trace entry to correlate trace records with the application that is requesting the buffers. It is the CSM user's responsibility to ensure that this value is different from the THREAD value specified by other users of the CSM. One way this can be achieved is by specifying an ECSA control block for THREAD.

To code: Specify the RS-type address, or address in register (2)-(12), of a 4-character field.

,UTILRTN=*utilrtn*

An optional input parameter that is issued from a utility routine. Specify the utility routine caller's address to be placed in the CSM trace entry. If this parameter is omitted, only the address of the CSM request issuer is placed in the CSM trace entry. This parameter is only relevant to the tracing process. It should be specified only if the CSM user requires identification of the caller of a utility routine in the CSM trace entry.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

Return Codes

The following codes can be returned to the application on this macroinstruction.

Return Code	Meaning
0	Request completed successfully.
4	Request did not complete successfully. See the following reason codes to determine the type of error encountered.

Reason Code	Meaning
2	Requested function not supported at the present time, service has not been initialized.
7	Buffer token specified is not valid.
8	Instance ID in the input buffer token does not match that of the buffer, possible attempt to use a buffer that has been freed.
9	Real storage unavailable to provide a fixed buffer, wait not requested.
15	Assign buffer request failed because the state of the buffer is guaranteed to be pageable.
20	BUFTYPE value specified is not valid for this request.

Return Code	Meaning
8	System error while processing the request. See the following reason codes to determine the type of error encountered.

Reason Code	Meaning
1	Unable to obtain storage for request.
6	An abend occurred while processing this request.

IVTCSM REQUEST=CHANGE_OWNER

Purpose

This macroinstruction allows the application to change the ownership of a buffer to another user.

Usage

This macroinstruction can be used to assume ownership of another user's buffers or to pass ownership to another user. The new owner must have sufficient information to address the buffers. This information can be found in the CSM buffer list. The owner of a set of buffers bears the responsibility for returning them to CSM on the IVTCSM REQUEST=FREE_BUFFER macroinstruction.

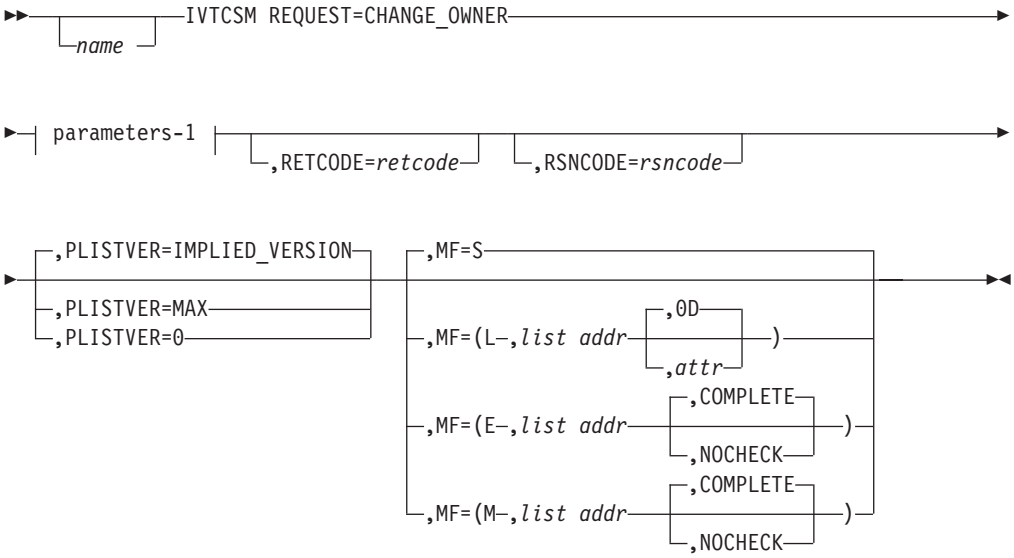
CSM associates a set of buffers that have been retrieved from a buffer pool with the OWNERID of an application. The OWNERID is the same as the application's ASID. Ownership of a buffer may be optionally qualified by specifying the TASKID parameter on the macroinstruction. The TASKID is a TCB address with the default being no task association.

Ownership of a buffer that has an associated buffer return exit is not actually changed due to an IVTCSM REQUEST=CHANGE_OWNER macroinstruction; the buffer is actually borrowed. The original owner of the buffer will be maintained so that ownership is restored when the buffer is freed. However, if the original owner's address space terminates before the buffer return exit is invoked, then buffers are returned to CSM.

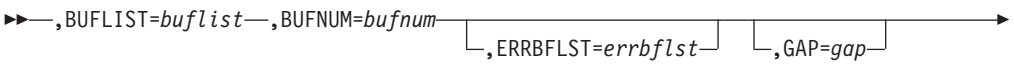
See "Ownership of Buffers" on page 8 for more information.

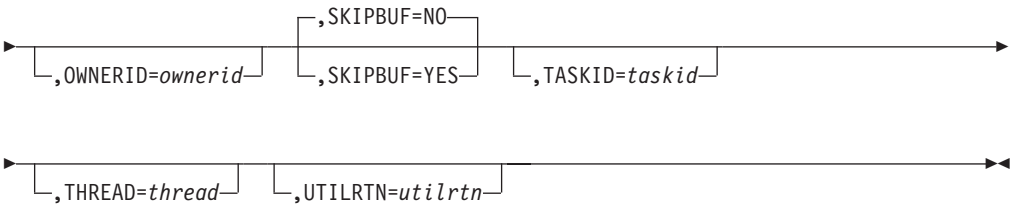
Syntax

main diagram



parameters-1





Parameters

The parameters are explained as follows:

name
An optional symbol, starting in column 1, that is the name on the IVTCSM macro invocation. The name must conform to the rules for an ordinary assembler language symbol.

,BUFLIST=*buflist*
A required input parameter of an area containing a list of buffer entries. The number of entries in the list is provided by BUFNUM. Each entry in the buffer list is mapped by IVTBUFL.

The following fields in IVTBUFL are required as input for this request.

- BUFL_VERSION
- BUFL_SOURCE

  Note: This field is only required when SKIPBUF=YES is specified.
- BUFL_TOKEN

There are no fields in IVTBUFL that are returned as output by CSM for this request.

To code: Specify the RS-type address, or address in register (2)-(12), of a field.

,BUFNUM=*bufnum*
A required input parameter, specifying the number of buffers to change ownership.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,ERRBFLST=*errbflst*
An optional output parameter containing the number of the last buffer entry that was successfully processed when an error is detected during processing of the macroinstruction.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,GAP=*gap*
An optional input parameter, specifying the number of bytes used to separate buffer entries. This parameter allows the buffer entries to be in discontiguous storage. If GAP is not specified, buffer entries are contiguous.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,MF=
An optional input parameter that specifies the macro form.

Use MF=S to specify the standard form of the macro, which builds an inline parameter list and generates the macro invocation to transfer control to the service. MF=S is the default.

Use MF=L to specify the list form of the macro. Use the list form together with the execute form of the macro for applications that require reentrant code. The list form defines an area of storage that the execute form uses to store the parameters. Only the PLISTVER parameter may be coded with the list form of the macro.

Use MF=E to specify the execute form of the macro. Use the execute form together with the list form of the macro for applications that require reentrant code. The execute form of the macro stores the parameters into the storage area defined by the list form, and generates the macro invocation to transfer control to the service.

Use MF=M together with the list and execute forms of the macro for service routines that need to provide different options according to user-provided input. Use the list form to define a storage area; use the modify form to set the appropriate options; then use the execute form to call the service.

,*list addr*
: The name of a storage area to contain the parameters. For MF=S, MF=E, and MF=M, this can be an RS-type address or an address in register (1)-(12).

,*attr*
: An optional 1- to 60-character input string that you use to force boundary alignment of the parameter list. Use a value of 0F to force the parameter list to a word boundary, or 0D to force the parameter list to a doubleword boundary. If you do not code *attr*, the system provides a value of 0D.

,COMPLETE
: Specifies that the system is to check for required parameters and supply defaults for omitted optional parameters.

,NOCHECK
: Specifies that the system is not to check for required parameters and is not to supply defaults for omitted optional parameters.

IBM recommends that you use the modify and execute forms of IVTCSM in the following order:

1. Use IVTCSM ...MF=(M,list-addr,COMPLETE), specifying appropriate parameters, including all required ones.
2. Use IVTCSM ...MF=(M,list-addr,NOCHECK), specifying the parameters that you want to change.
3. Use IVTCSM ...MF=(E,list-addr,NOCHECK), to execute the macro.

,OWNERID=*ownerid*
: An optional input parameter, specifying the owner to which the buffer is to be assigned. If not coded, the ASID of the issuing application is assigned as the OWNERID.

  To code: Specify the RS-type address, or address in register (2)-(12), of a halfword field.

,PLISTVER=
: An optional input parameter that specifies the version of the macro. PLISTVER determines which parameter list the system generates. PLISTVER is an optional input parameter on all forms of the macro, including the list form. When

using PLISTVER, specify it on all macro forms used for a request and with the same value on all of the macro forms. The values are:

- **IMPLIED_VERSION**, which is the lowest version that allows all parameters specified on the request to be processed. If you omit the PLISTVER parameter, IMPLIED_VERSION is the default.
- **MAX**, if you want the parameter list to be the largest size currently possible. This size might grow from release to release and affect the amount of storage that your program needs.

  If you can tolerate the size change, IBM recommends that you always specify PLISTVER=MAX on the list form of the macro. Specifying MAX ensures that the list-form parameter list is always long enough to hold all the parameters you might specify on the execute form; in this way, MAX ensures that the parameter list does not overwrite nearby storage.
- **0**, if you use the currently available parameters.

To code: Specify one of the following:
- IMPLIED_VERSION
- MAX
- A decimal value of 0

,RETCODE=*retcode*
An optional output parameter into which the return code is to be copied from GPR 15.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,RSNCODE=*rsncode*
An optional output parameter into which the reason code is to be copied from GPR 0.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,SKIPBUF=
An optional parameter, specifying whether all entries in the buffer list should be processed. The default is SKIPBUF=NO.

,SKIPBUF=NO
Specifies that all the entries in the buffer list will be processed. No entries are skipped. The BUFL_SOURCE value is not examined.

,SKIPBUF=YES
Specifies that the only entries in the buffer list that have a BUFL_SOURCE value indicating the user's non-CSM storage (BUFL_UDSPACE or BUFL_USTOR) will be skipped.

,TASKID=*taskid*
An optional input parameter that is to contain the address of a TCB. This further qualifies the ownership of a buffer to a specific task. If TASKID is not specified, the buffer is not associated with a task but is instead associated with the issuing application's ASID.

To code: Specify the RS-type address, or address in register (2)-(12), of a pointer field.

,THREAD=*thread*
An optional input parameter, specifying a unique identifier that is placed in the CSM trace entry to correlate trace records with the application that is requesting the buffers. It is the CSM user's responsibility to ensure that this value is different from the THREAD value specified by other users of the CSM. One way this can be achieved is by specifying an ECSA control block for THREAD.

To code: Specify the RS-type address, or address in register (2)-(12), of a 4-character field.

,UTILRTN=*utilrtn*

An optional input parameter that is issued from a utility routine. Specify the utility routine caller's address to be placed in the CSM trace entry. If this parameter is omitted, only the address of the CSM request issuer is placed in the CSM trace entry. This parameter is only relevant to the tracing process. It should be specified only if the CSM user requires identification of the caller of a utility routine in the CSM trace entry.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

Return Codes

The following codes can be returned to the application on this macroinstruction.

Return Code	Meaning
0	Request completed successfully.
4	Request did not complete successfully. See the following reason codes to determine the type of error encountered.

Reason Code	Meaning
2	Requested function not supported at the present time, service has not been initialized.
7	Invalid buffer token specified.
8	Instance ID in the input buffer token does not match that of the buffer, possible attempt to use a buffer that has been freed.
24	ASID specified on the OWNERID parameter is not active.

IVTCSM REQUEST=COPY_DATA

Purpose

This macroinstruction allows you to copy data to or from a CSM buffer or a user data area.

Usage

This macroinstruction assists the application by isolating it from possible storage key differences between that of the requester and that of the CSM buffer. It also assists users of CSM data space buffers by isolating the requester from the addressing method used to access a data space.

This macroinstruction allows multiple source buffers to be copied to or from one or multiple target buffers. The source buffers are copied to the target buffers using the source and target buffer lengths to pack data or span data across the target buffers as required.

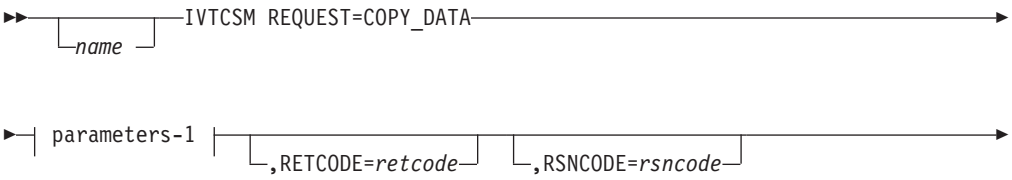
If the cumulative length of the source buffers is greater than the cumulative length of the target buffers, truncation of the source data will occur. The application can specify a character on the PADCHAR input parameter to pad the target buffers when the cumulative length of the source buffers is less than the cumulative length of the target buffers.

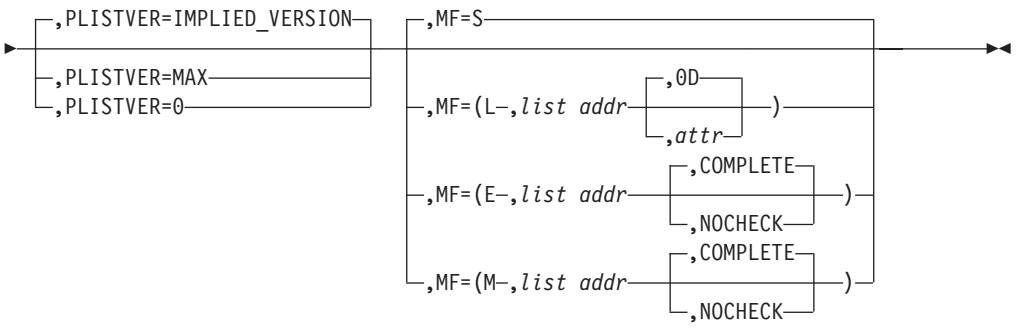
CSM accepts a source buffer list and a target buffer list as input. This is the same buffer list that is mapped by the IVTBUFL DSECT that is described on page 79. The number of entries in each list are not required to be equal. Within each list, entries may or may not represent a CSM buffer. The BUFL_SOURCE field in the entry indicates whether the entry represents a CSM buffer. For entries representing CSM buffers, the address that is the source or target of the copy is supplied by the requester and is not required to be the actual start address of the CSM buffer. CSM validates that the specified address and length corresponds to a storage area that is within the bounds of the CSM buffer. This validation is based on the size of the buffer as determined at the time the buffer pool was created.

The application can use the COPY_DATA request to copy data to or from a non-CSM data space using the ALET provided in the buffer list entry. The ALET must be valid for the address space for which it is being used.

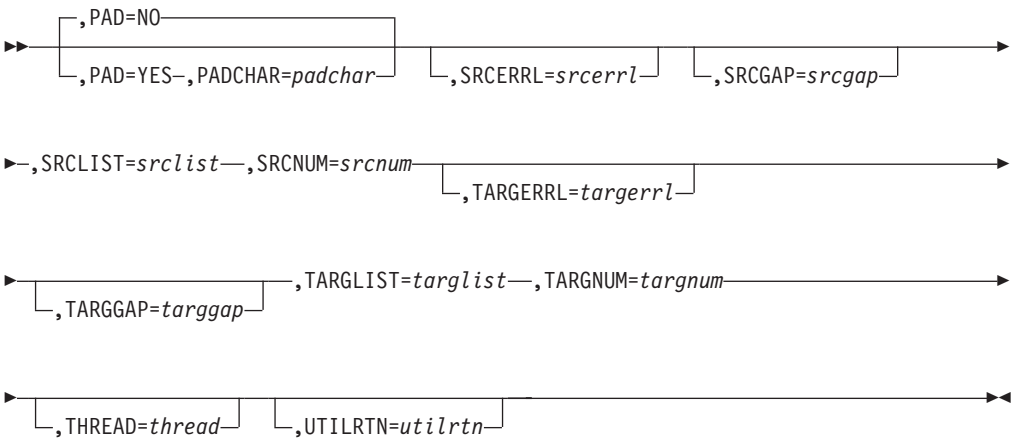
Syntax

main diagram





parameters-1



Parameters

The parameters are explained as follows:

name

An optional symbol, starting in column 1, that is the name on the IVTCSM macro invocation. The name must conform to the rules for an ordinary assembler language symbol.

,MF=

An optional input parameter that specifies the macro form.

Use MF=S to specify the standard form of the macro, which builds an inline parameter list and generates the macro invocation to transfer control to the service. MF=S is the default.

Use MF=L to specify the list form of the macro. Use the list form together with the execute form of the macro for applications that require reentrant code. The list form defines an area of storage that the execute form uses to store the parameters. Only the PLISTVER parameter may be coded with the list form of the macro.

Use MF=E to specify the execute form of the macro. Use the execute form together with the list form of the macro for applications that require reentrant code. The execute form of the macro stores the parameters into the storage area defined by the list form, and generates the macro invocation to transfer control to the service.

Use MF=M together with the list and execute forms of the macro for service routines that need to provide different options according to user-provided input. Use the list form to define a storage area; use the modify form to set the appropriate options; then use the execute form to call the service.

,*list addr*
The name of a storage area to contain the parameters. For MF=S, MF=E, and MF=M, this can be an RS-type address or an address in register (1)-(12).

,*attr*
An optional 1- to 60-character input string that you use to force boundary alignment of the parameter list. Use a value of 0F to force the parameter list to a word boundary, or 0D to force the parameter list to a doubleword boundary. If you do not code *attr*, the system provides a value of 0D.

,COMPLETE
Specifies that the system is to check for required parameters and supply defaults for omitted optional parameters.

,NOCHECK
Specifies that the system is not to check for required parameters and is not to supply defaults for omitted optional parameters.

IBM recommends that you use the modify and execute forms of IVTCSM in the following order:

1. Use IVTCSM ...MF=(M,list-addr,COMPLETE) specifying appropriate parameters, including all required ones.
2. Use IVTCSM ...MF=(M,list-addr,NOCHECK), specifying the parameters that you want to change.
3. Use IVTCSM ...MF=(E,list-addr,NOCHECK), to execute the macro.

,PAD=
An optional parameter that indicates if padding is to be performed. The default is PAD=NO.

,PAD=NO
Indicates that padding is not performed.

,PAD=YES
Indicates that padding is to be performed using the value specified by PADCHAR.

,PADCHAR=*padchar*
When PAD=YES is specified, a required input parameter, specifying the character to use as pad if the cumulative target length is greater than the cumulative source length. If PAD=YES is not specified, then no padding is performed.

To code: Specify the RS-type address, or address in register (2)-(12), of a 1-character field.

,PLISTVER=
An optional input parameter that specifies the version of the macro. PLISTVER determines which parameter list the system generates. PLISTVER is an optional input parameter on all forms of the macro, including the list form. When using PLISTVER, specify it on all macro forms used for a request and with the same value on all of the macro forms. The values are:

- **IMPLIED_VERSION**, which is the lowest version that allows all parameters specified on the request to be processed. If you omit the PLISTVER parameter, IMPLIED_VERSION is the default.
- **MAX**, if you want the parameter list to be the largest size currently possible. This size might grow from release to release and affect the amount of storage that your program needs.

  If you can tolerate the size change, IBM recommends that you always specify PLISTVER=MAX on the list form of the macro. Specifying MAX ensures that the list-form parameter list is always long enough to hold all the parameters you might specify on the execute form; in this way, MAX ensures that the parameter list does not overwrite nearby storage.
- **0**, if you use the currently available parameters.

To code: Specify one of the following:
- IMPLIED_VERSION
- MAX
- A decimal value of 0

,RETCODE=*retcode*
An optional output parameter into which the return code is to be copied from GPR 15.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,RSNCODE=*rsncode*
An optional output parameter into which the reason code is to be copied from GPR 0.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,SRCERRL=*srcerrl*
An optional output parameter, specifying the number of the last buffer entry that was successfully processed in the SRCLIST.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,SRCGAP=*srcgap*
An optional input parameter, specifying the number of bytes used to separate buffer entries in SRCLIST. This parameter allows the buffer entries to be in discontiguous storage. If this parameter is not specified, buffer entries will be in contiguous storage.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,SRCLIST=*srclist*
A required input parameter of an area containing a list of information about the buffers from which the data is to be copied. Each entry in the list describes a buffer and is mapped by IVTBUFL. The number of entries is equal to the number of buffers specified by SRCNUM. The buffer entry may represent a CSM buffer or a user data area.

The following fields in IVTBUFL are required as input for this request.
- BUFL_VERSION
- BUFL_SOURCE
- BUFL_TOKEN

Note: This field is only required if data is being copied from a CSM buffer.

- BUFL_ALET

  Note: This field is only required to access the data in a user data space.
- BUFL_ADDR
- BUFL_SIZE

To code: Specify the RS-type address, or address in register (2)-(12), of a field.

,SRCNUM=*srcnum*
A required input parameter, specifying the number of source buffers for the copy.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,TARGERRL=*targerrl*
An optional output parameter, specifying the number of the last buffer entry that was successfully processed in the TARGLIST. id=″xCMCO37″>**To code:** Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,TARGGAP=*targgap*
An optional input parameter, specifying the number of bytes used to separate buffer entries in TARGLIST. This parameter allows the buffer entries to be in discontiguous storage. If this parameter is not specified, buffer entries will be in contiguous storage.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,TARGLIST=*targlist*
A required input parameter of an area containing a list of information about the buffers that are the target of the copy operation. Each entry in the list is a buffer entry mapped by IVTBUFL. The buffer entry may represent a CSM buffer or a user data area.

The following fields in IVTBUFL are required as input for this request.
- BUFL_VERSION
- BUFL_SOURCE
- BUFL_TOKEN

  Note: This field is only required if data is being copied into a CSM buffer.
- BUFL_ALET

  Note: This field is only required to copy data into a user data space.
- BUFL_ADDR
- BUFL_SIZE

There are no fields in IVTBUFL returned as output, by CSM, for this request.

To code: Specify the RS-type address, or address in register (2)-(12), of a field.

,TARGNUM=*targnum*
A required input parameter, specifying the number of target buffers for the copy.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,THREAD=*thread*
An optional input parameter, specifying a unique identifier that is placed in the

CSM trace entry to correlate trace records with the application that is requesting the buffers. It is the CSM user's responsibility to ensure that this value is different from the THREAD value specified by other users of the CSM. One way this can be achieved is by specifying an ECSA control block for THREAD.

To code: Specify the RS-type address, or address in register (2)-(12), of a 4-character field.

,UTILRTN=*utilrtn*

An optional input parameter that is issued from a utility routine. Specify the utility routine caller's address to be placed in the CSM trace entry. If this parameter is omitted, only the address of the CSM request issuer is placed in the CSM trace entry. This parameter is only relevant to the tracing process. It should be specified only if the CSM user requires identification of the caller of a utility routine in the CSM trace entry.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

Return Codes

The following codes can be returned to the application on this macroinstruction.

Return Code	Meaning
0	Request completed successfully.
4	Request did not complete successfully. See the following reason codes to determine the type of error encountered.

Reason Code	Meaning
2	Requested function not supported at the present time, service has not been initialized.
7	Invalid buffer token specified.
8	Instance ID in the input buffer token does not match that of the buffer, possible attempt to use a buffer that has been freed.
12	Address and length specified on a copy data request for a source buffer descriptor is outside the bounds of the CSM buffer represented by the specified pool token.
13	Address and length specified on a copy data request for a target buffer descriptor is outside the bounds of the CSM buffer represented by the specified pool token.
14	Copy operation resulted in truncation of source data due to insufficient buffer space provided by the target buffer list.
18	BUFL_SOURCE value is not valid for an entry in the Source buffer list (SRCLIST).
19	BUFL_SOURCE value is not valid for an entry in the Target buffer list (TRGLIST).
20	BUFTYPE value specified is not valid for this request.
21	BUFSOURC value specified is not valid for this request.

22	Source and target buffers overlap, no data has been copied.

IVTCSM REQUEST=CREATE_POOL

Purpose

This macroinstruction allows the user to register as a user of a storage pool of buffers residing in ECSA or in a data space.

The structures to maintain the storage pools are created in response to the first CREATE_POOL request by a user of CSM. For storage pools requesting a data space as the storage type, a data space is created on the first request for a pool of this type. Multiple storage pools may exist per data space. Data space storage pools are further qualified as 31-bit backed (when fixed, the real storage frame containing the page is below the 2-gigabyte real storage bar) or 64-bit backed (when fixed, the real storage frame containing the page can be on or above the 2-gigabyte real storage bar). If a 64-bit backed pool is requested and cannot be created because the machine is not executing in z/Architecture mode, the request is converted to a 31-bit backed request for the corresponding pool size.

On the create request, the caller specifies the size of the buffers in the pool to be created (4096, 16384, 32768, 61440, and 184320), and for dataspace pools, whether or not the pool is 31-bit backed or 64-bit backed. Only one pool of a given size exists per storage type. Requests by other callers for a pool of the same characteristics will share the existing pool. The EXPBUF, INITBUF, and MINFREE values for each pool are each set to the largest value specified by any single user sharing a pool. Therefore, these values can also be adjusted downward when a user discontinues sharing a pool (that is, the user issues a DELETE_POOL request).

Usage

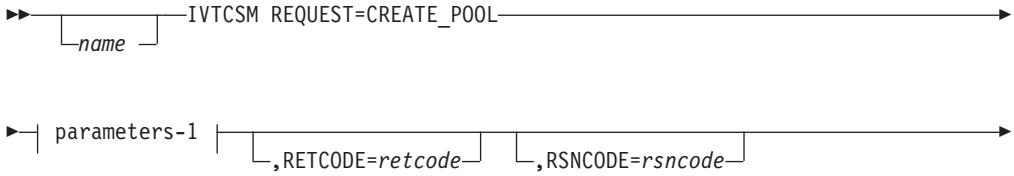
This macroinstruction should be used by an application if it subsequently will request buffers from CSM.

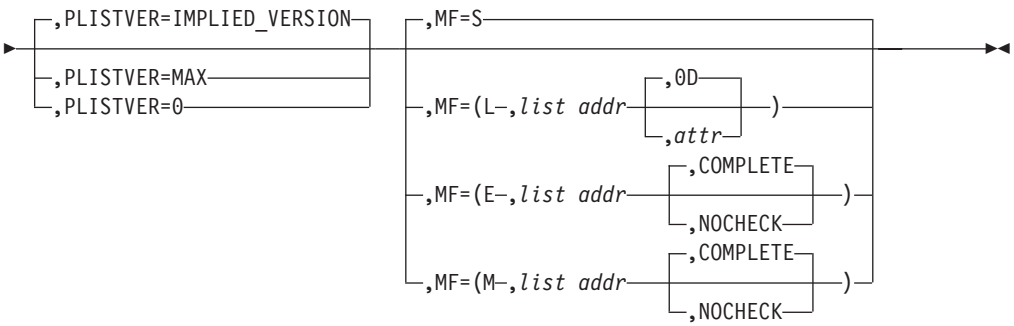
Environment

This macroinstruction must be issued in task mode; it is not allowed in cross memory mode.

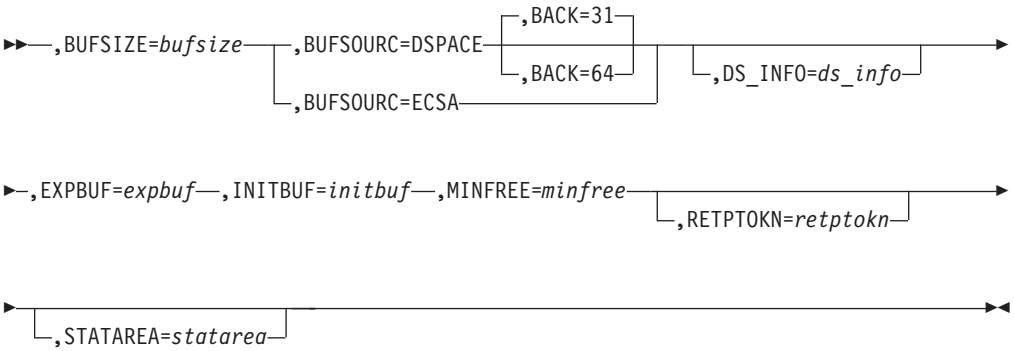
Syntax

main diagram





parameters-1



Parameters

The parameters are explained as follows:

name
: An optional symbol, starting in column 1, that is the name on the IVTCSM macro invocation. The name must conform to the rules for an ordinary assembler language symbol.

,BACK=*location*
: An optional parameter that applies to BUFSOURCE=DSPACE. Specifies whether or not the data space storage, when fixed, can be backed above the 2-gigabyte real storage bar. BACK=31 forces the storage to be backed below the 2-gigabyte bar and BACK=64 allows the storage to be backed on or above the 2-gigabyte bar. BACK=31 is the default. If a 64-bit backed pool is requested and cannot be created because the machine is not executing in z/Architecture mode, the request is converted to a 31-bit backed request for the corresponding pool size.

,BUFSIZE=*bufsize*
: A required input parameter, specifying the size of the buffers in the pool to be created. Valid pool sizes are 4096, 16384, 32768, 61440, and 184320. All other values specified on this parameter are rounded up to the next valid pool size. However, if BUFSIZE is greater than 184320, the CREATE_POOL request is rejected.

  To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,BUFSOURC=

A required parameter, specifying the source of the storage from which the buffers are to be allocated.

,BUFSOURC=DSPACE

Indicates that the storage pool is to be created in data space.

,BUFSOURC=ECSA

Indicates that the storage pool is to be created in ECSA.

,DS_INFO=*ds_info*

An optional output parameter that contains the address of an area containing the information required to dump CSM data spaces mapped by IVTDATSP.

To code: Specify the RS-type address, or address in register (2)-(12), of a pointer field.

,EXPBUF=*expbuf*

A required input parameter, specifying the number of buffers by which the pool is expanded when the number of free buffers falls below the value for MINFREE or when a GET_BUFFER request needs to be satisfied.

Valid ranges for EXPBUF are noted in the following chart. If a value outside of a range is specified, then CSM will use a default value. The default values for EXPBUF are also noted in the chart.

Pool Size	Valid Range	Default
4096	1-256	16
16384	1-256	8
32768	1-128	4
61440	1-68	4
184320	1-22	2

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,INITBUF=*initbuf*

A required input parameter, specifying the initial number of buffers to be created in the storage pool. If zero is specified, the base pool will only be created to represent the requester as a user of the pool. In this case, the pool will be expanded on the first GET_BUFFER macroinstruction based on the specification for EXPBUF.

Note that the pool will not contract if the number of buffers currently available is not at a certain value. The value is determine as the higher of INITBUF or MINFREE+(2*EXPBUF).

Valid values for INITBUF are 0–9999. If a value outside of this range is specified, then CSM will use a default value. The default values for INITBUF are noted in the following chart.

Pool Size	Default
4096	64
16384	32
32768	16
61440	16

Pool Size	Default
184320	2

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,MF=
An optional input parameter that specifies the macro form.

Use MF=S to specify the standard form of the macro, which builds an inline parameter list and generates the macro invocation to transfer control to the service. MF=S is the default.

Use MF=L to specify the list form of the macro. Use the list form together with the execute form of the macro for applications that require reentrant code. The list form defines an area of storage that the execute form uses to store the parameters. Only the PLISTVER parameter may be coded with the list form of the macro.

Use MF=E to specify the execute form of the macro. Use the execute form together with the list form of the macro for applications that require reentrant code. The execute form of the macro stores the parameters into the storage area defined by the list form, and generates the macro invocation to transfer control to the service.

Use MF=M together with the list and execute forms of the macro for service routines that need to provide different options according to user-provided input. Use the list form to define a storage area; use the modify form to set the appropriate options; then use the execute form to call the service.

,*list addr*
The name of a storage area to contain the parameters. For MF=S, MF=E, and MF=M, this can be an RS-type address or an address in register (1)-(12).

,*attr*
An optional 1- to 60-character input string that you use to force boundary alignment of the parameter list. Use a value of 0F to force the parameter list to a word boundary, or 0D to force the parameter list to a doubleword boundary. If you do not code *attr*, the system provides a value of 0D.

,COMPLETE
Specifies that the system is to check for required parameters and supply defaults for omitted optional parameters.

,NOCHECK
Specifies that the system is not to check for required parameters and is not to supply defaults for omitted optional parameters.

IBM recommends that you use the modify and execute forms of IVTCSM in the following order:

1. Use IVTCSM ...MF=(M,list-addr,COMPLETE) specifying appropriate parameters, including all required ones.
2. Use IVTCSM ...MF=(M,list-addr,NOCHECK), specifying the parameters that you want to change.
3. Use IVTCSM ...MF=(E,list-addr,NOCHECK), to execute the macro.

,MINFREE=*minfree*

A required input parameter, specifying the minimum number of buffers to be free in the pool at any time. The storage pool will be expanded if the number of free buffers falls below this limit.

Valid values for MINFREE are 0-9999. If a value outside of this range is specified, then CSM will use a default value. The default values for MINFREE are noted in the following chart.

Pool Size	Default
4096	8
16384	4
32768	2
61440	2
184320	1

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,PLISTVER=

An optional input parameter that specifies the version of the macro. PLISTVER determines which parameter list the system generates. PLISTVER is an optional input parameter on all forms of the macro, including the list form. When using PLISTVER, specify it on all macro forms used for a request and with the same value on all of the macro forms. The values are:

- **IMPLIED_VERSION**, which is the lowest version that allows all parameters specified on the request to be processed. If you omit the PLISTVER parameter, IMPLIED_VERSION is the default.
- **MAX**, if you want the parameter list to be the largest size currently possible. This size might grow from release to release and affect the amount of storage that your program needs.

  If you can tolerate the size change, IBM recommends that you always specify PLISTVER=MAX on the list form of the macro. Specifying MAX ensures that the list-form parameter list is always long enough to hold all the parameters you might specify on the execute form; in this way, MAX ensures that the parameter list does not overwrite nearby storage.
- **0**, if you use the currently available parameters.

To code: Specify one of the following:
- IMPLIED_VERSION
- MAX
- A decimal value of 0

,RETCODE=*retcode*

An optional output parameter into which the return code is to be copied from GPR 15.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,RETPTOKN=*retptokn*

An optional output parameter of an area in which the application is to receive a token representing this user of this pool. This token must be supplied as input on the IVTCSM REQUEST=DELETE_POOL and IVTCSM REQUEST=GET_BUFFER macroinstructions, with the POOLTOKN parameter associated with this pool.

To code: Specify the RS-type address, or address in register (2)-(12), of a 10-character field.

,RSNCODE=*rsncode*
An optional output parameter into which the reason code is to be copied from GPR 0.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,STATAREA=*statarea*
An optional output parameter that contains the address an area containing the resource statistics mapped by IVTSTATA.

To code: Specify the RS-type address, or address in register (2)-(12), of a pointer field.

Return Codes

The following codes can be returned to the application on this macroinstruction.

Return Code	Meaning
0	Request completed successfully.
4	Request did not complete successfully. See the following reason codes to determine the type of error encountered.

Reason Code	Meaning
3	Specified buffer size is large than supported size.
4	Buffer pool cannot be expanded to satisfy request.
21	BUFSOURC value is not valid for this request.
23	Unable to create the specified pool. Creation of the pool would cause the ECSA maximum limit to be exceeded.

Return Code	Meaning
8	System error while processing the request. See the following reason codes to determine the type of error encountered.

Reason Code	Meaning
1	Unable to obtain storage for request.
2	Schedule SRB fail for PC routine.
3	Unable to create ALET for data space.
4	Error encountered while creating the data space.
5	Unable to create another data space. Number of data spaces exceeds the maximum.
6	An abend occurred while processing this request.

IVTCSM REQUEST=DELETE_POOL

Purpose

This macroinstruction allows the user to indicate that it is no longer a registered user of the storage pool.

Since each pool may have multiple users, a storage pool will not be deleted until all buffers have been returned by all users and delete requests have been received for each corresponding create request.

Usage

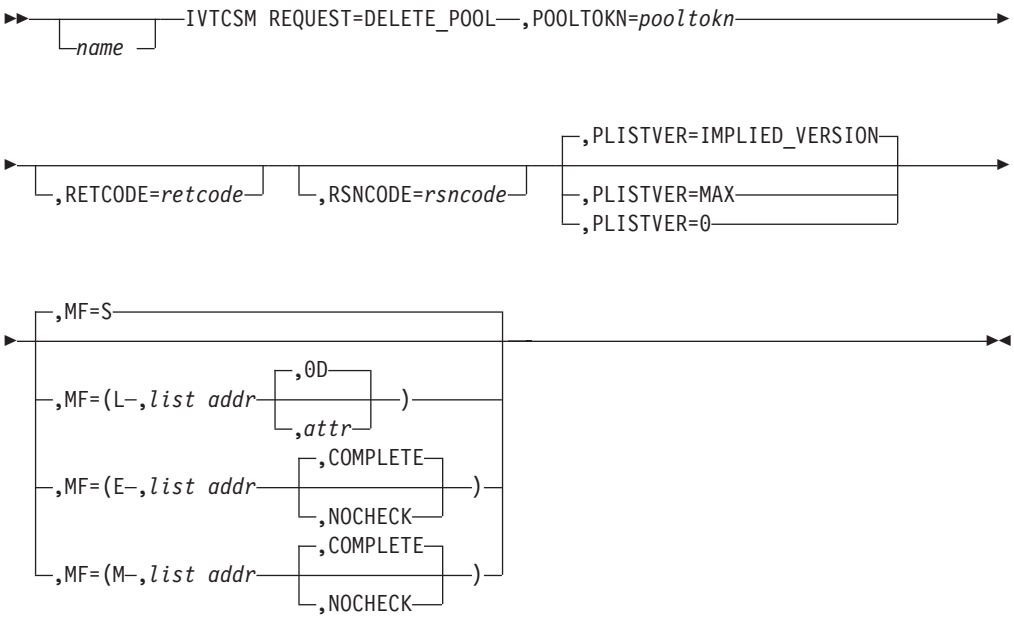
This macroinstruction should be used only if an IVTCSM REQUEST=CREATE_POOL macroinstruction was previously issued by the application.

Environment

This macroinstruction must be issued in task mode; it is not allowed in cross memory mode.

Syntax

main diagram



Parameters

The parameters are explained as follows:

name
: An optional symbol, starting in column 1, that is the name on the IVTCSM macro invocation. The name must conform to the rules for an ordinary assembler language symbol.

,MF=
: An optional input parameter that specifies the macro form.

Use MF=S to specify the standard form of the macro, which builds an inline parameter list and generates the macro invocation to transfer control to the service. MF=S is the default.

Use MF=L to specify the list form of the macro. Use the list form together with the execute form of the macro for applications that require reentrant code. The list form defines an area of storage that the execute form uses to store the parameters. Only the PLISTVER parameter may be coded with the list form of the macro.

Use MF=E to specify the execute form of the macro. Use the execute form together with the list form of the macro for applications that require reentrant code. The execute form of the macro stores the parameters into the storage area defined by the list form, and generates the macro invocation to transfer control to the service.

Use MF=M together with the list and execute forms of the macro for service routines that need to provide different options according to user-provided input. Use the list form to define a storage area; use the modify form to set the appropriate options; then use the execute form to call the service.

,*list addr*
The name of a storage area to contain the parameters. For MF=S, MF=E, and MF=M, this can be an RS-type address or an address in register (1)-(12).

,*attr*
An optional 1- to 60-character input string that you use to force boundary alignment of the parameter list. Use a value of 0F to force the parameter list to a word boundary, or 0D to force the parameter list to a doubleword boundary. If you do not code *attr*, the system provides a value of 0D.

,COMPLETE
Specifies that the system is to check for required parameters and supply defaults for omitted optional parameters.

,NOCHECK
Specifies that the system is not to check for required parameters and is not to supply defaults for omitted optional parameters.

IBM recommends that you use the modify and execute forms of IVTCSM in the following order:

1. Use IVTCSM ...MF=(M,list-addr,COMPLETE) specifying appropriate parameters, including all required ones.
2. Use IVTCSM ...MF=(M,list-addr,NOCHECK), specifying the parameters that you want to change.
3. Use IVTCSM ...MF=(E,list-addr,NOCHECK), to execute the macro.

,PLISTVER=
An optional input parameter that specifies the version of the macro. PLISTVER determines which parameter list the system generates. PLISTVER is an optional input parameter on all forms of the macro, including the list form. When using PLISTVER, specify it on all macro forms used for a request and with the same value on all of the macro forms. The values are:

- **IMPLIED_VERSION**, which is the lowest version that allows all parameters specified on the request to be processed. If you omit the PLISTVER parameter, IMPLIED_VERSION is the default.

- **MAX**, if you want the parameter list to be the largest size currently possible. This size might grow from release to release and affect the amount of storage that your program needs.

  If you can tolerate the size change, IBM recommends that you always specify PLISTVER=MAX on the list form of the macro. Specifying MAX ensures that the list-form parameter list is always long enough to hold all the parameters you might specify on the execute form; in this way, MAX ensures that the parameter list does not overwrite nearby storage.
- **0**, if you use the currently available parameters.

To code: Specify one of the following:
- IMPLIED_VERSION
- MAX
- A decimal value of 0

,POOLTOKN=*pooltokn*
A required input parameter of a token representing this user of this pool. This must be the token provided to the application on the associated IVTCSM REQUEST=CREATE_POOL macroinstruction.

To code: Specify the RS-type address, or address in register (2)-(12), of a 10-character field.

,RETCODE=*retcode*
An optional output parameter into which the return code is to be copied from GPR 15.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,RSNCODE=*rsncode*
An optional output parameter into which the reason code is to be copied from GPR 0.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

Return Codes

The following codes can be returned to the application on this macroinstruction.

Return Code	Meaning
0	Request completed successfully.
4	Request did not complete successfully. See the following reason codes to determine the type of error encountered.

Reason Code	Meaning
2	Requested function not supported at the present time, service has not been initialized.
6	Pool token specified not valid.

Return Code	Meaning
8	System error while processing the request.

Reason Code	Meaning
6	An abend occurred while processing this request.

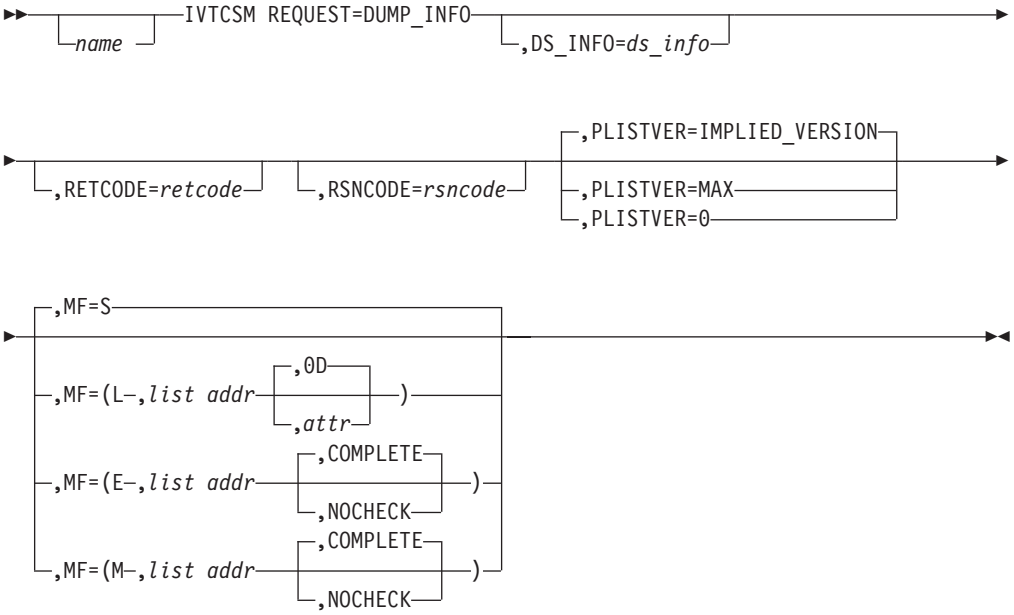
IVTCSM REQUEST=DUMP_INFO

Purpose
This macroinstruction requests the address of the information required to include CSM data space information in a dump.

Usage
CSM returns the address of the requested information in the address provided on the DS_INFO parameter. This information is mapped by the IVTDATSP DSECT as described on page 80.

Syntax

main diagram



Parameters
The parameters are explained as follows:

name
An optional symbol, starting in column 1, that is the name on the IVTCSM macro invocation. The name must conform to the rules for an ordinary assembler language symbol.

,DS_INFO=*ds_info*
An optional output parameter that contains the address of an area containing the information required to dump CSM data spaces mapped by IVTDATSP.

To code: Specify the RS-type address, or address in register (2)-(12), of a pointer field.

,MF=
An optional input parameter that specifies the macro form.

Use MF=S to specify the standard form of the macro, which builds an inline parameter list and generates the macro invocation to transfer control to the service. MF=S is the default.

Use MF=L to specify the list form of the macro. Use the list form together with the execute form of the macro for applications that require reentrant code. The list form defines an area of storage that the execute form uses to store the parameters. Only the PLISTVER parameter may be coded with the list form of the macro.

Use MF=E to specify the execute form of the macro. Use the execute form together with the list form of the macro for applications that require reentrant code. The execute form of the macro stores the parameters into the storage area defined by the list form, and generates the macro invocation to transfer control to the service.

Use MF=M together with the list and execute forms of the macro for service routines that need to provide different options according to user-provided input. Use the list form to define a storage area; use the modify form to set the appropriate options; then use the execute form to call the service.

,*list addr*
The name of a storage area to contain the parameters. For MF=S, MF=E, and MF=M, this can be an RS-type address or an address in register (1)-(12).

,*attr*
An optional 1- to 60-character input string that you use to force boundary alignment of the parameter list. Use a value of 0F to force the parameter list to a word boundary, or 0D to force the parameter list to a doubleword boundary. If you do not code *attr*, the system provides a value of 0D.

,COMPLETE
Specifies that the system is to check for required parameters and supply defaults for omitted optional parameters.

,NOCHECK
Specifies that the system is not to check for required parameters and is not to supply defaults for omitted optional parameters.

IBM recommends that you use the modify and execute forms of IVTCSM in the following order:

1. Use IVTCSM ...MF=(M,list-addr,COMPLETE) specifying appropriate parameters, including all required ones.
2. Use IVTCSM ...MF=(M,list-addr,NOCHECK), specifying the parameters that you want to change.
3. Use IVTCSM ...MF=(E,list-addr,NOCHECK), to execute the macro.

,PLISTVER=
An optional input parameter that specifies the version of the macro. PLISTVER determines which parameter list the system generates. PLISTVER is an optional input parameter on all forms of the macro, including the list form. When using PLISTVER, specify it on all macro forms used for a request and with the same value on all of the macro forms. The values are:

- **IMPLIED_VERSION**, which is the lowest version that allows all parameters specified on the request to be processed. If you omit the PLISTVER parameter, IMPLIED_VERSION is the default.
- **MAX**, if you want the parameter list to be the largest size currently possible. This size might grow from release to release and affect the amount of storage that your program needs.

  If you can tolerate the size change, IBM recommends that you always specify PLISTVER=MAX on the list form of the macro. Specifying MAX ensures that

the list-form parameter list is always long enough to hold all the parameters you might specify on the execute form; in this way, MAX ensures that the parameter list does not overwrite nearby storage.

- **0**, if you use the currently available parameters.

To code: Specify one of the following:
- IMPLIED_VERSION
- MAX
- A decimal value of 0

,RETCODE=*retcode*
An optional output parameter into which the return code is to be copied from GPR 15.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,RSNCODE=*rsncode*
An optional output parameter into which the reason code is to be copied from GPR 0.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

Return Codes

The following codes can be returned to the application on this macroinstruction.

Return Code	Meaning
0	Request completed successfully.
4	Request did not complete successfully. See the following reason codes to determine the type of error encountered.

Reason Code	Meaning
2	Requested function not supported at the present time, service has not been initialized.

IVTCSM REQUEST=FIX_BUFFER

Purpose

This macroinstruction allows an application to change the pageable state of a buffer to be guaranteed to be fixed.

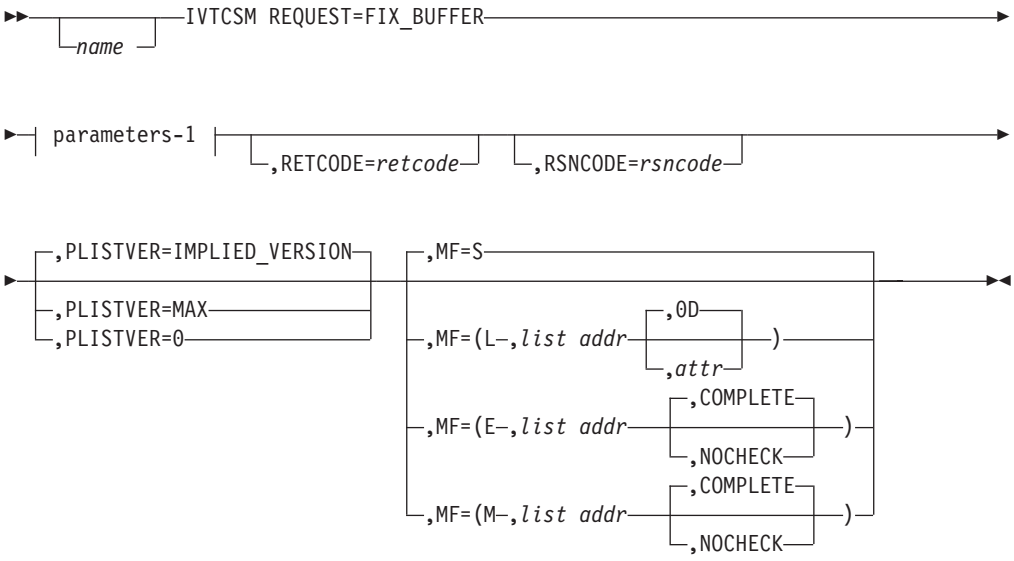
Usage

If a buffer is guaranteed to be pageable or eligible to be pagefreed, an application can use this macroinstruction to make the buffer guaranteed to be fixed.

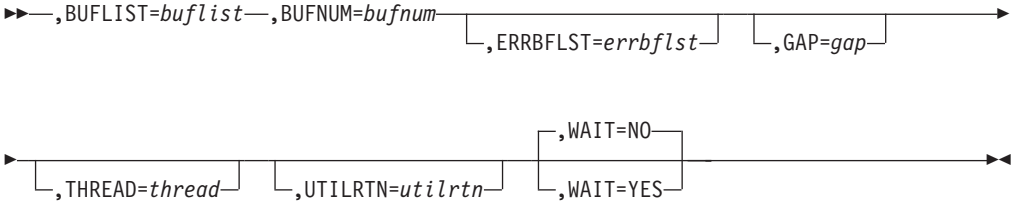
See “Fixed Buffers Versus Pageable Buffers” on page 8 for more information.

Syntax

main diagram



parameters-1



Parameters

The parameters are explained as follows:

name
: An optional symbol, starting in column 1, that is the name on the IVTCSM macro invocation. The name must conform to the rules for an ordinary assembler language symbol.

,BUFLIST=*buflist*
: A required input parameter of an area in which the application program is to

provide a list of buffer entries. The number of entries in the list is equal to the value specified by the BUFNUM parameter. A entry in the list is mapped by IVTBUFL.

The following fields in IVTBUFL are required as input for this request.
- BUFL_VERSION
- BUFL_TOKEN

The following field in IVTBUFL is returned as output by CSM for this request.
- BUFL_TYPE

To code: Specify the RS-type address, or address in register (2)-(12), of a field.

,BUFNUM=*bufnum*
A required input parameter, specifying the number of buffers to be made guaranteed to be fixed.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,ERRBFLST=*errbflst*
An optional output parameter containing the number of the last buffer entry that was successfully processed when an error is detected during processing of the macroinstruction.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,GAP=*gap*
An optional input parameter, specifying the number of bytes used to separate buffer entries. This parameter allows the buffer entries to be in discontiguous storage. If GAP is not specified, buffer entries are in contiguous storage.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,MF=
An optional input parameter that specifies the macro form.

Use MF=S to specify the standard form of the macro, which builds an inline parameter list and generates the macro invocation to transfer control to the service. MF=S is the default.

Use MF=L to specify the list form of the macro. Use the list form together with the execute form of the macro for applications that require reentrant code. The list form defines an area of storage that the execute form uses to store the parameters. Only the PLISTVER parameter may be coded with the list form of the macro.

Use MF=E to specify the execute form of the macro. Use the execute form together with the list form of the macro for applications that require reentrant code. The execute form of the macro stores the parameters into the storage area defined by the list form, and generates the macro invocation to transfer control to the service.

Use MF=M together with the list and execute forms of the macro for service routines that need to provide different options according to user-provided input. Use the list form to define a storage area; use the modify form to set the appropriate options; then use the execute form to call the service.

,*list addr*

The name of a storage area to contain the parameters. For MF=S, MF=E, and MF=M, this can be an RS-type address or an address in register (1)-(12).

,*attr*

An optional 1- to 60-character input string that you use to force boundary alignment of the parameter list. Use a value of 0F to force the parameter list to a word boundary, or 0D to force the parameter list to a doubleword boundary. If you do not code *attr*, the system provides a value of 0D.

,COMPLETE

Specifies that the system is to check for required parameters and supply defaults for omitted optional parameters.

,NOCHECK

Specifies that the system is not to check for required parameters and is not to supply defaults for omitted optional parameters.

IBM recommends that you use the modify and execute forms of IVTCSM in the following order:

1. Use IVTCSM ...MF=(M,list-addr,COMPLETE) specifying appropriate parameters, including all required ones.
2. Use IVTCSM ...MF=(M,list-addr,NOCHECK), specifying the parameters that you want to change.
3. Use IVTCSM ...MF=(E,list-addr,NOCHECK), to execute the macro.

,PLISTVER=

An optional input parameter that specifies the version of the macro. PLISTVER determines which parameter list the system generates. PLISTVER is an optional input parameter on all forms of the macro, including the list form. When using PLISTVER, specify it on all macro forms used for a request and with the same value on all of the macro forms. The values are:

- **IMPLIED_VERSION**, which is the lowest version that allows all parameters specified on the request to be processed. If you omit the PLISTVER parameter, IMPLIED_VERSION is the default.
- **MAX**, if you want the parameter list to be the largest size currently possible. This size might grow from release to release and affect the amount of storage that your program needs.

  If you can tolerate the size change, IBM recommends that you always specify PLISTVER=MAX on the list form of the macro. Specifying MAX ensures that the list-form parameter list is always long enough to hold all the parameters you might specify on the execute form; in this way, MAX ensures that the parameter list does not overwrite nearby storage.
- **0**, if you use the currently available parameters.

To code: Specify one of the following:

- IMPLIED_VERSION
- MAX
- A decimal value of 0

,RETCODE=*retcode*

An optional output parameter into which the return code is to be copied from GPR 15.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,RSNCODE=*rsncode*

An optional output parameter into which the reason code is to be copied from GPR 0.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,THREAD=*thread*

An optional input parameter, specifying a unique identifier that is placed in the CSM trace entry to correlate trace records with the application that is requesting the buffers. It is the CSM user's responsibility to ensure that this value is different from the THREAD value specified by other users of the CSM. One way this can be achieved is by specifying an ECSA control block for THREAD.

To code: Specify the RS-type address, or address in register (2)-(12), of a 4-character field.

,UTILRTN=*utilrtn*

An optional input parameter that is issued from a utility routine. Specify the utility routine caller's address to be placed in the CSM trace entry. If this parameter is omitted, only the address of the CSM request issuer is placed in the CSM trace entry. This parameter is only relevant to the tracing process. It should be specified only if the CSM user requires identification of the caller of a utility routine in the CSM trace entry.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,WAIT=

An optional parameter, specifying whether or not the request should wait for fixed storage to become available. The default is WAIT=NO.

,WAIT=NO

Specifies that this macroinstruction completes without waiting for fixed storage to become available.

,WAIT=YES

Specifies that this macroinstruction will not complete until fixed storage becomes available. If fixed storage is not available, users will be suspended until enough fixed storage is available to satisfy the request.

Return Codes

The following codes can be returned to the application on this macroinstruction.

Return Code	Meaning
0	Request completed successfully.
4	Request did not complete successfully. See the following reason codes to determine the type of error encountered.

Reason Code	Meaning
2	Requested function not supported at the present time, service has not been initialized.
7	Specified buffer token is not valid.
8	Instance ID in the input buffer token does not match that of the buffer, possible attempt to use a buffer that has been freed.
9	Real storage unavailable to provide a fixed buffer, wait not requested.

8	System error while processing the request.

Reason Code	Meaning
6	An abend occurred while processing this request.

IVTCSM REQUEST=FREE_BUFFER

Purpose

This macroinstruction allows an application to return one or more buffers to a storage pool. It is also used to logically return a buffer that has been assigned to multiple owners. The buffer is returned to CSM when the owner of the last buffer image returns it to CSM and a buffer return exit routine was not specified during the initial allocation of the buffer.

Usage

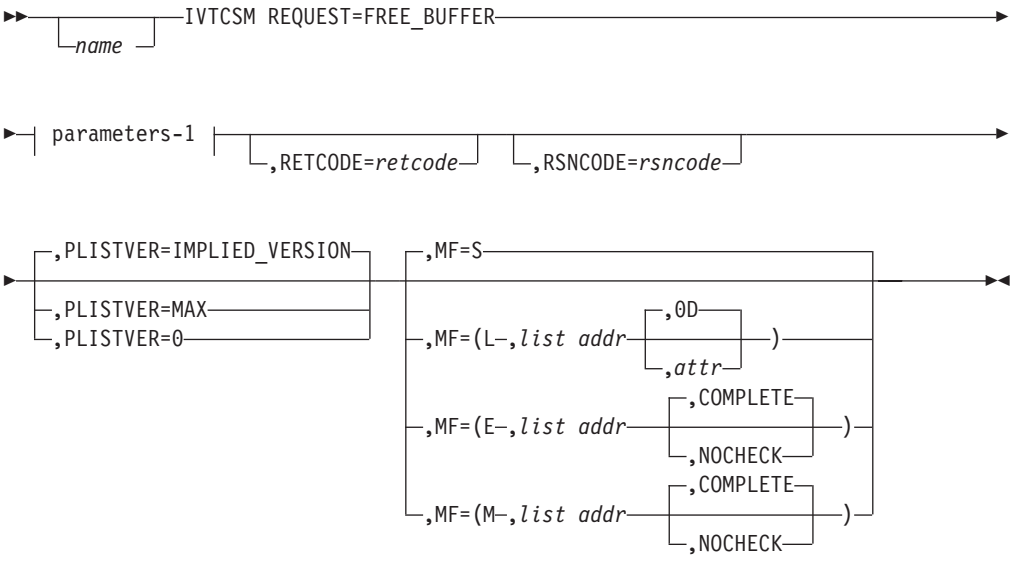
An application may specify the address of a buffer return exit routine that is to receive control when the IVTCSM REQUEST=FREE_BUFFER macroinstruction is issued. See “Buffer Return Exit Routine” on page 16 for more information. An application may optionally specify that the buffer return exit address specified when the buffer was obtained is to be overridden, allowing a buffer to be freed back to CSM that was obtained specifying a free routine address. This option is requested by specifying FREETO=CSM; it must be invoked in this manner only by the requester of the buffer that specified a free routine on the GET_BUFFER request. If others use this option, the buffer will not be returned to the original owner of the buffer.

The application may optionally specify that the buffer obtained is to be cleared when it is returned to the pool on a FREE_BUFFER request. This allows secure data to be cleared after use.

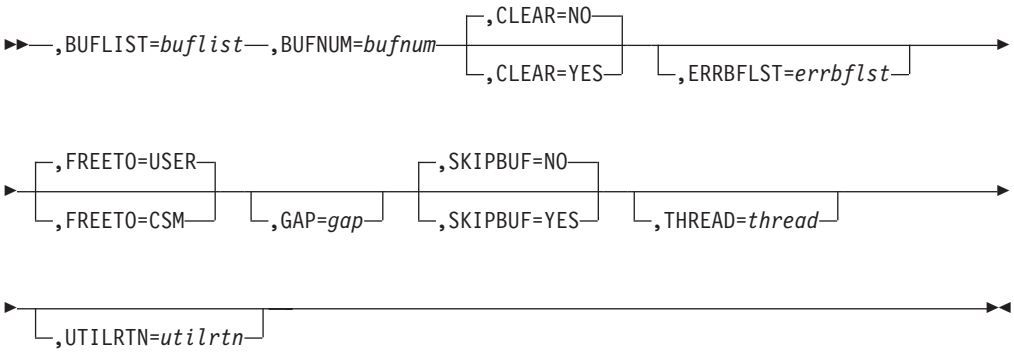
All IVTCSM REQUEST=GET_BUFFER|ASSIGN_BUFFER macroinstructions must have a corresponding FREE_BUFFER request before the buffer is considered available for reallocation by CSM, or before a buffer return exit routine is invoked for a buffer obtained specifying a buffer return exit routine. This is necessary to ensure that all users have finished using the buffer.

Syntax

main diagram



parameters-1



Parameters

The parameters are explained as follows:

name
An optional symbol, starting in column 1, that is the name on the IVTCSM macro invocation. The name must conform to the rules for an ordinary assembler language symbol.

,BUFLIST=*buflist*
A required input parameter of an area containing a list of buffer entries. The number of entries in the list is specified by BUFNUM. An entry in the list is mapped by IVTBUFL.

The following fields in IVTBUFL are required as input for this request.
- BUFL_VERSION
- BUFL_SOURCE

  Note: This field is only required when SKIPBUF=YES is specified.
- BUFL_TOKEN

There are no fields in IVTBUFL returned as output by CSM for this request.

To code: Specify the RS-type address, or address in register (2)-(12), of a field.

,BUFNUM=*bufnum*
A required input parameter, specifying the number of buffer entries in the list.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,CLEAR=
An optional parameter, specifying whether the buffer is to be cleared when returned to storage pool. The default is CLEAR=NO.

,CLEAR=NO
Specifies that the buffer is not cleared when returned to the storage pool. If the buffer was originally allocated with a CLEAR value of YES, then CLEAR=NO is ignored by CSM and the buffer will be cleared when returned to the storage pool.

,CLEAR=YES
Specifies that the buffer is to be cleared. Specifying CLEAR=YES will not cause a buffer to be cleared that is returned via a user-specified free

routine. However, if CLEAR=YES is specified, the buffer is cleared in the event that it is returned to the storage pool.

,ERRBFLST=*errbflst*
An optional output parameter, specifying the number of the last buffer entry that was successfully processed when an error is detected during processing of the macroinstruction.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,FREETO=
An optional parameter, allowing the FREERTN parameter on the IVTCSM REQUEST=GET_BUFFER macroinstruction to be overridden. The default is FREETO=USER.

,FREETO=USER
Specifies that the buffer is to be returned to the free routine specified on the GET_BUFFER request.

,FREETO=CSM
Specifies that the free routine address provided when the buffer was obtained is to be overridden and the buffer is to be returned to the storage pool. This option should only be used by the original owner of the buffer.

,GAP=*gap*
An optional input parameter, specifying the number of bytes used to separate buffer entries. This parameter allows the buffer entries to be in discontiguous storage. If GAP is not specified, buffer entries are not contiguous.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,MF=
An optional input parameter that specifies the macro form.

Use MF=S to specify the standard form of the macro, which builds an inline parameter list and generates the macro invocation to transfer control to the service. MF=S is the default.

Use MF=L to specify the list form of the macro. Use the list form together with the execute form of the macro for applications that require reentrant code. The list form defines an area of storage that the execute form uses to store the parameters. Only the PLISTVER parameter may be coded with the list form of the macro.

Use MF=E to specify the execute form of the macro. Use the execute form together with the list form of the macro for applications that require reentrant code. The execute form of the macro stores the parameters into the storage area defined by the list form, and generates the macro invocation to transfer control to the service.

Use MF=M together with the list and execute forms of the macro for service routines that need to provide different options according to user-provided input. Use the list form to define a storage area; use the modify form to set the appropriate options; then use the execute form to call the service.

,*list addr*
The name of a storage area to contain the parameters. For MF=S, MF=E, and MF=M, this can be an RS-type address or an address in register (1)-(12).

,*attr*

An optional 1- to 60-character input string that you use to force boundary alignment of the parameter list. Use a value of 0F to force the parameter list to a word boundary, or 0D to force the parameter list to a doubleword boundary. If you do not code *attr*, the system provides a value of 0D.

,COMPLETE

Specifies that the system is to check for required parameters and supply defaults for omitted optional parameters.

,NOCHECK

Specifies that the system is not to check for required parameters and is not to supply defaults for omitted optional parameters.

IBM recommends that you use the modify and execute forms of IVTCSM in the following order:

1. Use IVTCSM ...MF=(M,list-addr,COMPLETE) specifying appropriate parameters, including all required ones.
2. Use IVTCSM ...MF=(M,list-addr,NOCHECK), specifying the parameters that you want to change.
3. Use IVTCSM ...MF=(E,list-addr,NOCHECK), to execute the macro.

,PLISTVER=

An optional input parameter that specifies the version of the macro. PLISTVER determines which parameter list the system generates. PLISTVER is an optional input parameter on all forms of the macro, including the list form. When using PLISTVER, specify it on all macro forms used for a request and with the same value on all of the macro forms. The values are:

- **IMPLIED_VERSION**, which is the lowest version that allows all parameters specified on the request to be processed. If you omit the PLISTVER parameter, IMPLIED_VERSION is the default.
- **MAX**, if you want the parameter list to be the largest size currently possible. This size might grow from release to release and affect the amount of storage that your program needs.

  If you can tolerate the size change, IBM recommends that you always specify PLISTVER=MAX on the list form of the macro. Specifying MAX ensures that the list-form parameter list is always long enough to hold all the parameters you might specify on the execute form; in this way, MAX ensures that the parameter list does not overwrite nearby storage.
- **0**, if you use the currently available parameters.

To code: Specify one of the following:

- IMPLIED_VERSION
- MAX
- A decimal value of 0

,RETCODE=*retcode*

An optional output parameter into which the return code is to be copied from GPR 15.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,RSNCODE=*rsncode*

An optional output parameter into which the reason code is to be copied from GPR 0.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,SKIPBUF=

An optional parameter, specifying whether all entries in the buffer list should be processed. The default is SKIPBUF=NO.

,SKIPBUF=NO

Specifies that all the entries in the buffer list will be processed. No entries are skipped. The BUFL_SOURCE value is not examined.

,SKIPBUF=YES

Specifies that the only entries in the buffer list that have a BUFL_SOURCE value indicating the user's non-CSM storage (BUFL_UDSPACE or BUFL_USTOR) will be skipped.

,THREAD=*thread*

An optional input parameter, specifying a unique identifier that is placed in the CSM trace entry to correlate trace records with the application that is requesting the buffers. It is the CSM user's responsibility to ensure that this value is different from the THREAD value specified by other users of the CSM. One way this can be achieved is by specifying an ECSA control block for THREAD.

To code: Specify the RS-type address, or address in register (2)-(12), of a 4-character field.

,UTILRTN=*utilrtn*

An optional input parameter that is issued from a utility routine. Specify the utility routine caller's address to be placed in the CSM trace entry. If this parameter is omitted, only the address of the CSM request issuer is placed in the CSM trace entry. This parameter is only relevant to the tracing process. It should be specified only if the CSM user requires identification of the caller of a utility routine in the CSM trace entry.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

Return Codes

The following codes can be returned to the application on this macroinstruction.

Return Code	Meaning
0	Request completed successfully.
4	Request did not complete successfully. See the following reason codes to determine the type of error encountered.

Reason Code	Meaning
2	Requested function not supported at the present time, service has not been initialized.
7	Pool token specified is not valid.
8	Instance ID in the input buffer token does not match that of the buffer, possible attempt to use a buffer that has been freed.

Return Code	Meaning
8	System error while processing the request.

Reason Code	Meaning
6	An abend occurred while processing this request.

IVTCSM REQUEST=GET_BUFFER

Purpose

This macroinstruction allows an application to request one or more buffers of a given size from the CSM storage pool.

Usage

For the IVTCSM REQUEST=GET_BUFFER macroinstruction, CSM allocates buffers from a pre-existing pool and returns information to the requester needed to address the buffer. This includes the ALET of a buffer that resides in a data space. The value specified on the POOLTOKN parameter must be the same value returned on the RETPTOKN parameter of the IVTCSM REQUEST=CREATE_POOL macroinstruction.

The application has the option of requesting buffers that are guaranteed to be fixed, guaranteed to be pageable, or eligible to be made pageable. A pageable buffer can be obtained and used when fixed buffers are unavailable, and fixed at a later time using the IVTCSM REQUEST=FIX_BUFFER macroinstruction. For data space buffers, the pool token provided on the GET_BUFFER invocation is used to determine whether the returned buffer is backed by 31-bit or 64-bit real storage. If BACK=64 was specified on the CREATE_POOL invocation and the machine supports 64-bit backed storage, then a 64-bit backed buffer is returned. If BACK=31 was specified or taken as the default, or BACK=64 was specified but the machine is not executing in z/Architecture mode, then a 31-bit backed buffer is returned.

Ownership of the buffers is assigned to the requesting address space by default. This can be overridden by specifying OWNERID. The OWNERID is the ASID of the address space. Ownership of a buffer can be optionally qualified for a given task by specifying TASKID. The TASKID is a TCB address.

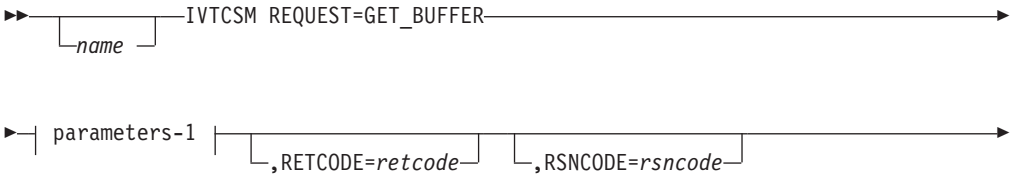
A buffer token is returned with each buffer. The buffer token is the means by which this buffer is known to CSM. This token must be used with all other requests to CSM for the associated buffer.

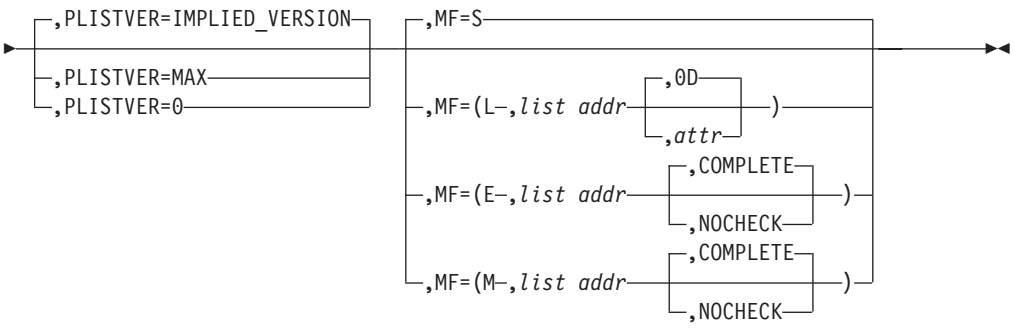
The application can also specify a free routine address that is to receive control when the IVTCSM REQUEST=FREE_BUFFER macroinstruction is issued for the buffer. The default is that the buffers are to be returned to CSM.

The application can also specify that the buffer obtained is to be cleared when it is returned to the pool. This provides for secure data to be cleared once processing is complete.

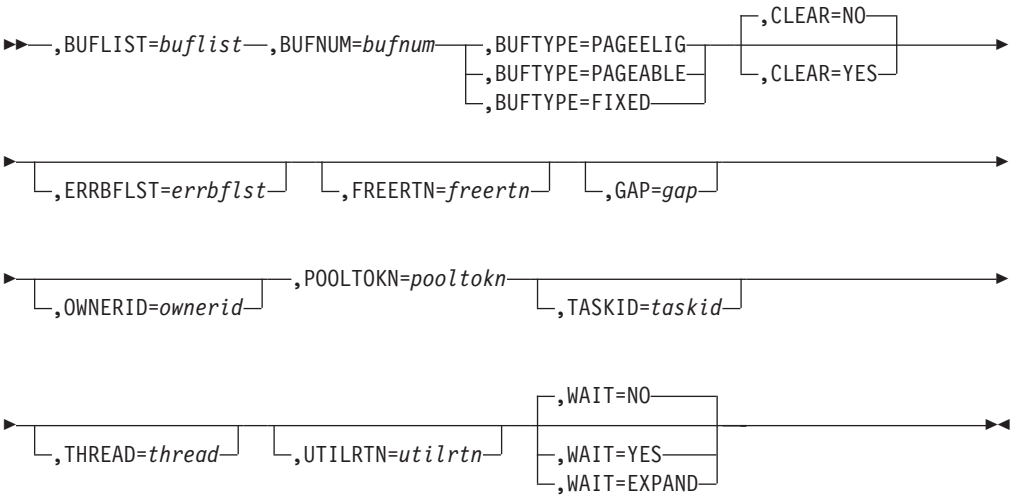
Syntax

main diagram





parameters-1



Parameters

The parameters are explained as follows:

name

An optional symbol, starting in column 1, that is the name on the IVTCSM macro invocation. The name must conform to the rules for an ordinary assembler language symbol.

,BUFLIST=*buflist*

A required input parameter of an area containing a list of buffer entries. The number of entries in the list is equal to the value specified by the BUFNUM parameter. An entry in the list is mapped by IVTBUFL.

The following field in IVTBUFL is required as input for this request.

- BUFL_VERSION

The following fields in IVTBUFL are returned as output by CSM for this request.

- BUFL_SOURCE
- BUFL_TYPE
- BUFL_TOKEN
- BUFL_ALET

Note: This field is returned only if the buffer was allocated from a data space.

- BUFL_ADDR
- BUFL_SIZE

To code: Specify the RS-type address, or address in register (2)-(12), of a field.

,BUFNUM=*bufnum*
A required input parameter, specifying the number of buffers to be obtained.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,BUFTYPE=
A required parameter, specifying whether the buffers are to be guaranteed to be fixed, guaranteed to be pageable or eligible to be made pageable.

,BUFTYPE=PAGEELIG
Indicates that the buffers are eligible to be made pageable.

,BUFTYPE=PAGEABLE
Indicates that the buffers are to be guaranteed to be pageable.

,BUFTYPE=FIXED
Indicates that buffers are to be guaranteed to be fixed.

,CLEAR=
An optional parameter, specifying whether the buffer is to be cleared when returned to the storage pool. The default is CLEAR=NO.

,CLEAR=NO
Specifies that the buffer is not cleared when returned to the buffer pool

,CLEAR=YES
Specifies that the buffer is cleared. Specifying CLEAR=YES will not cause a buffer to be cleared that is returned via a user-specified free routine. However, if CLEAR=YES is specified, the buffer is cleared in the event that it is returned to the storage pool.

,ERRBFLST=*errbflst*
An optional output parameter containing the number of the last buffer entry that was successfully processed when an error is detected during processing of the macroinstruction.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,FREERTN=*freertn*
An optional input parameter that is to contain the address of an application routine that is to receive control when the buffer is freed. This allows the buffer to be passed to another application or product such as VTAM and to receive the buffer back when the receiver is finished. The free routine is scheduled for execution in the address space of the original owner of the buffer. See “Buffer Return Exit Routine” on page 16 for more information.

To code: Specify the RS-type address, or address in register (2)-(12), of a pointer field.

,GAP=*gap*
An optional input parameter, specifying the number of bytes used to separate buffer entries. This parameter allows the buffer entries to be in discontiguous storage. If GAP is not specified, buffer entries are contiguous.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,MF=

An optional input parameter that specifies the macro form.

Use MF=S to specify the standard form of the macro, which builds an inline parameter list and generates the macro invocation to transfer control to the service. MF=S is the default.

Use MF=L to specify the list form of the macro. Use the list form together with the execute form of the macro for applications that require reentrant code. The list form defines an area of storage that the execute form uses to store the parameters. Only the PLISTVER parameter may be coded with the list form of the macro.

Use MF=E to specify the execute form of the macro. Use the execute form together with the list form of the macro for applications that require reentrant code. The execute form of the macro stores the parameters into the storage area defined by the list form, and generates the macro invocation to transfer control to the service.

Use MF=M together with the list and execute forms of the macro for service routines that need to provide different options according to user-provided input. Use the list form to define a storage area; use the modify form to set the appropriate options; then use the execute form to call the service.

,*list addr*

The name of a storage area to contain the parameters. For MF=S, MF=E, and MF=M, this can be an RS-type address or an address in register (1)-(12).

,*attr*

An optional 1- to 60-character input string that you use to force boundary alignment of the parameter list. Use a value of 0F to force the parameter list to a word boundary, or 0D to force the parameter list to a doubleword boundary. If you do not code *attr*, the system provides a value of 0D.

,COMPLETE

Specifies that the system is to check for required parameters and supply defaults for omitted optional parameters.

,NOCHECK

Specifies that the system is not to check for required parameters and is not to supply defaults for omitted optional parameters.

IBM recommends that you use the modify and execute forms of IVTCSM in the following order:

1. Use IVTCSM ...MF=(M,list-addr,COMPLETE) specifying appropriate parameters, including all required ones.
2. Use IVTCSM ...MF=(M,list-addr,NOCHECK), specifying the parameters that you want to change.
3. Use IVTCSM ...MF=(E,list-addr,NOCHECK), to execute the macro.

,OWNERID=*ownerid*

An optional input parameter, specifying the owner of the buffer being obtained.

To code: Specify the RS-type address, or address in register (2)-(12), of a halfword field.

,PLISTVER=

An optional input parameter that specifies the version of the macro. PLISTVER determines which parameter list the system generates. PLISTVER is an optional input parameter on all forms of the macro, including the list form. When

using PLISTVER, specify it on all macro forms used for a request and with the same value on all of the macro forms. The values are:

- **IMPLIED_VERSION**, which is the lowest version that allows all parameters specified on the request to be processed. If you omit the PLISTVER parameter, IMPLIED_VERSION is the default.
- **MAX**, if you want the parameter list to be the largest size currently possible. This size might grow from release to release and affect the amount of storage that your program needs.

  If you can tolerate the size change, IBM recommends that you always specify PLISTVER=MAX on the list form of the macro. Specifying MAX ensures that the list-form parameter list is always long enough to hold all the parameters you might specify on the execute form; in this way, MAX ensures that the parameter list does not overwrite nearby storage.
- **0**, if you use the currently available parameters.

To code: Specify one of the following:
- IMPLIED_VERSION
- MAX
- A decimal value of 0

,POOLTOKN=*pooltokn*
A required input parameter of the token representing this user of this pool. This must be the token provided to the application on the associated IVTCSM REQUEST=CREATE_POOL macroinstruction.

To code: Specify the RS-type address, or address in register (2)-(12), of a 10-character field.

,RETCODE=*retcode*
An optional output parameter into which the return code is to be copied from GPR 15.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,RSNCODE=*rsncode*
An optional output parameter into which the reason code is to be copied from GPR 0.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,TASKID=*taskid*
An optional input parameter that is to contain the address of a TCB. This further qualifies the ownership of a buffer to a specific task. If TASKID is not specified, the buffer is not associated with a task but is instead associated with the issuing application's ASID.

To code: Specify the RS-type address, or address in register (2)-(12), of a pointer field.

,THREAD=*thread*
An optional input parameter, specifying a unique identifier that is placed in the CSM trace entry to correlate trace records with the application that is requesting the buffers. It is the CSM user's responsibility to ensure that this value is different from the THREAD value specified by other users of the CSM. One way this can be achieved is by specifying an ECSA control block for THREAD.

To code: Specify the RS-type address, or address in register (2)-(12), of a 4-character field.

,UTILRTN=*utilrtn*

An optional input parameter that is issued from a utility routine. Specify the utility routine caller's address to be placed in the CSM trace entry. If this parameter is omitted, only the address of the CSM request issuer is placed in the CSM trace entry. This parameter is only relevant to the tracing process. It should be specified only if the CSM user requires identification of the caller of a utility routine in the CSM trace entry.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,WAIT=

An optional parameter, specifying whether or not the request should wait for buffers to become available. The default is WAIT=NO.

,WAIT=NO

Specifies that this macroinstruction completes without waiting for an available buffer.

,WAIT=YES

Specifies that this macroinstruction will not complete until all buffers become available. If buffers are not available, users will be suspended until enough buffers become available to satisfy the request.

,WAIT=EXPAND

Specifies that this macroinstruction will wait for pool expansion to complete. If enough buffers are not available to satisfy the request, users will be suspended until expansion completes.

Return Codes

The following codes can be returned to the application on this macroinstruction.

Return Code	Meaning
0	Request completed successfully.
4	Request did not complete successfully. See the following reason codes to determine the type of error encountered.

Reason Code	Meaning
2	Requested function not supported at the present time, service has not been initialized.
4	Buffer pool cannot be expanded to satisfy request.
5	No available buffers in pool, wait not requested.
6	Pool token specified is not valid.
9	Real storage unavailable to provide a fixed buffer, wait not requested.
11	A problem has been detected with the pool associated with the CSM request. The user should free all buffers when finished using them and issue a delete pool request to terminate usage of this pool. To allocate new buffers, a new pool must be created by issuing a new create pool request.
16	Instance ID in the input pooltoken does not match that of the user, possible attempt to allocate buffers after issuing a DELETE_POOL request.
17	Extent has been overlaid. Reissue the request.

	20	BUFTYPE value specified is not valid for this request.
	24	ASID specified on the OWNERID parameter is not active.
8	System error while processing the request. See the following reason codes to determine the type of error encountered.	
	Reason Code	**Meaning**
	1	Unable to obtain storage for request.
	3	Unable to create ALET for data space.
	4	Error encountered, while creating the data space.
	5	Unable to create another data space. Number of data spaces exceeds the maximum.
	6	An abend occurred while processing this request.

IVTCSM REQUEST=PAGE_BUFFER

Purpose

This macroinstruction allows an application to change the pageable state of a buffer.

Usage

An application can use this macroinstruction to make the buffer guaranteed to be pageable or eligible to be paged.

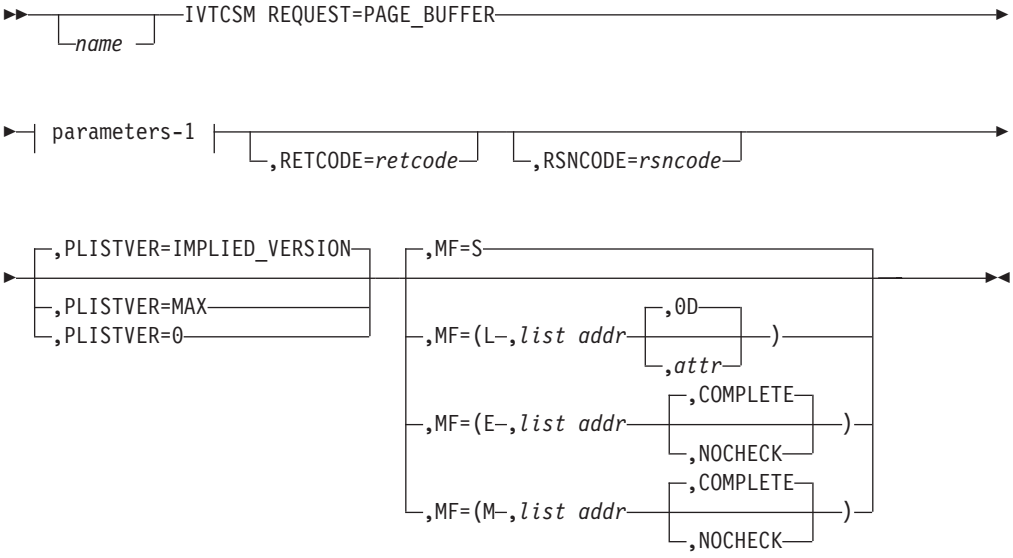
When BUFTYPE=PAGEELIG is specified on this macroinstruction, the buffer is marked as eligible to be paged. The buffer is not physically unfixed unless CSM requires real storage to satisfy another CSM request. This avoids the potential overhead of unnecessary fixing and freeing of storage.

This macroinstruction may be used to avoid consuming real storage for data that is being held in a buffer for possible use at a later time.

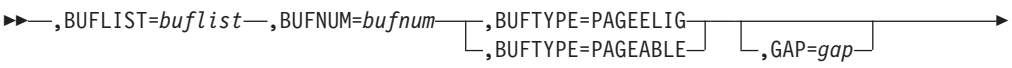
When BUFTYPE=PAGEABLE is specified on this macroinstruction, the buffer is marked as guaranteed to be pageable. This macroinstruction may be used when a system service requires pageable storage on input. This macroinstruction can be issued only for a buffer consisting of one image. This restriction guarantees that a user of a buffer that has multiple images can successfully issue a FIX_BUFFER request if necessary. Fixing a buffer requires that the entire buffer be fixed, even if the user is interested in only a piece of the buffer.

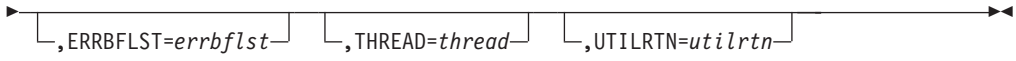
Syntax

main diagram



parameters-1





Parameters

The parameters are explained as follows:

name
An optional symbol, starting in column 1, that is the name on the IVTCSM macro invocation. The name must conform to the rules for an ordinary assembler language symbol.

,BUFLIST=*buflist*
A required input parameter of an area containing a list of buffer entries. The number of entries in the list is specified by BUFNUM. An entry in the buffer list is mapped by IVTBUFL.

The following fields in IVTBUFL are required as input for this request.
- BUFL_VERSION
- BUFL_TOKEN

The following field in IVTBUFL is returned as output by CSM for this request.
- BUFL_TYPE

To code: Specify the RS-type address, or address in register (2)-(12), of a field.

,BUFNUM=*bufnum*
A required input parameter, specifying the number of buffers to be made pageable or eligible to be paged.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,BUFTYPE=
A required parameter, specifying whether the buffers are to be guaranteed to be pageable or eligible to be made pageable.

,BUFTYPE=PAGEELIG
Indicates that the buffers are eligible to be made pageable.

,BUFTYPE=PAGEABLE
Indicates that the buffers are to be guaranteed to be pageable.

,ERRBFLST=*errbflst*
An optional output parameter containing the number of the last buffer entry that was successfully processed when an error is detected during processing of the macroinstruction.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,GAP=*gap*
An optional input parameter, specifying the number of bytes used to separate buffer entries. This parameter allows the buffer entries to be in discontiguous storage. If GAP is not specified, buffer entries are contiguous.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

,MF=
An optional input parameter that specifies the macro form.

Use MF=S to specify the standard form of the macro, which builds an inline parameter list and generates the macro invocation to transfer control to the service. MF=S is the default.

Use MF=L to specify the list form of the macro. Use the list form together with the execute form of the macro for applications that require reentrant code. The list form defines an area of storage that the execute form uses to store the parameters. Only the PLISTVER parameter may be coded with the list form of the macro.

Use MF=E to specify the execute form of the macro. Use the execute form together with the list form of the macro for applications that require reentrant code. The execute form of the macro stores the parameters into the storage area defined by the list form, and generates the macro invocation to transfer control to the service.

Use MF=M together with the list and execute forms of the macro for service routines that need to provide different options according to user-provided input. Use the list form to define a storage area; use the modify form to set the appropriate options; then use the execute form to call the service.

,*list addr*
The name of a storage area to contain the parameters. For MF=S, MF=E, and MF=M, this can be an RS-type address or an address in register (1)-(12).

,*attr*
An optional 1- to 60-character input string that you use to force boundary alignment of the parameter list. Use a value of 0F to force the parameter list to a word boundary, or 0D to force the parameter list to a doubleword boundary. If you do not code *attr*, the system provides a value of 0D.

,COMPLETE
Specifies that the system is to check for required parameters and supply defaults for omitted optional parameters.

,NOCHECK
Specifies that the system is not to check for required parameters and is not to supply defaults for omitted optional parameters.

IBM recommends that you use the modify and execute forms of IVTCSM in the following order:

1. Use IVTCSM ...MF=(M,list-addr,COMPLETE) specifying appropriate parameters, including all required ones.
2. Use IVTCSM ...MF=(M,list-addr,NOCHECK), specifying the parameters that you want to change.
3. Use IVTCSM ...MF=(E,list-addr,NOCHECK), to execute the macro.

,PLISTVER=
An optional input parameter that specifies the version of the macro. PLISTVER determines which parameter list the system generates. PLISTVER is an optional input parameter on all forms of the macro, including the list form. When using PLISTVER, specify it on all macro forms used for a request and with the same value on all of the macro forms. The values are:

- **IMPLIED_VERSION**, which is the lowest version that allows all parameters specified on the request to be processed. If you omit the PLISTVER parameter, IMPLIED_VERSION is the default.

- **MAX**, if you want the parameter list to be the largest size currently possible. This size might grow from release to release and affect the amount of storage that your program needs.

  If you can tolerate the size change, IBM recommends that you always specify PLISTVER=MAX on the list form of the macro. Specifying MAX ensures that the list-form parameter list is always long enough to hold all the parameters you might specify on the execute form; in this way, MAX ensures that the parameter list does not overwrite nearby storage.
- **0**, if you use the currently available parameters.

To code: Specify one of the following:
- IMPLIED_VERSION
- MAX
- A decimal value of 0

,RETCODE=*retcode*
An optional output parameter into which the return code is to be copied from GPR 15.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,RSNCODE=*rsncode*
An optional output parameter into which the reason code is to be copied from GPR 0.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,THREAD=*thread*
An optional input parameter, specifying a unique identifier that is placed in the CSM trace entry to correlate trace records with the application that is requesting the buffers. It is the CSM user's responsibility to ensure that this value is different from the THREAD value specified by other users of the CSM. One way this can be achieved is by specifying an ECSA control block for THREAD.

To code: Specify the RS-type address, or address in register (2)-(12), of a 4-character field.

,UTILRTN=*utilrtn*
An optional input parameter that is issued from a utility routine. Specify the utility routine caller's address to be placed in the CSM trace entry. If this parameter is omitted, only the address of the CSM request issuer is placed in the CSM trace entry. This parameter is only relevant to the tracing process. It should be specified only if the CSM user requires identification of the caller of a utility routine in the CSM trace entry.

To code: Specify the RS-type address, or address in register (2)-(12), of a fullword field.

Return Codes

The following codes can be returned to the application on this macroinstruction.

Return Code	Meaning
0	Request completed successfully.
4	Request did not complete successfully. See the following reason codes to determine the type of error encountered.

Reason Code	Meaning
2	Requested function not supported at the present time, service has not been initialized.

	7	Pool token specified is not valid.
	8	Instance ID in the input pool token does not match that of the buffer, possible attempt to use a buffer that has been freed.
	10	Request to make a buffer pageable denied, more than one image of the buffer exists.
	20	BUFTYPE value specified is not valid for this request.
8	System error while processing the request	
	Reason Code	**Meaning**
	1	Unable to obtain storage for request.
	6	An abend occurred while processing this request.

IVTCSM REQUEST=RESOURCE_STATS

Purpose

This macroinstruction requests that the address of the information required to monitor the usage of ECSA, data space, and fixed storage be returned.

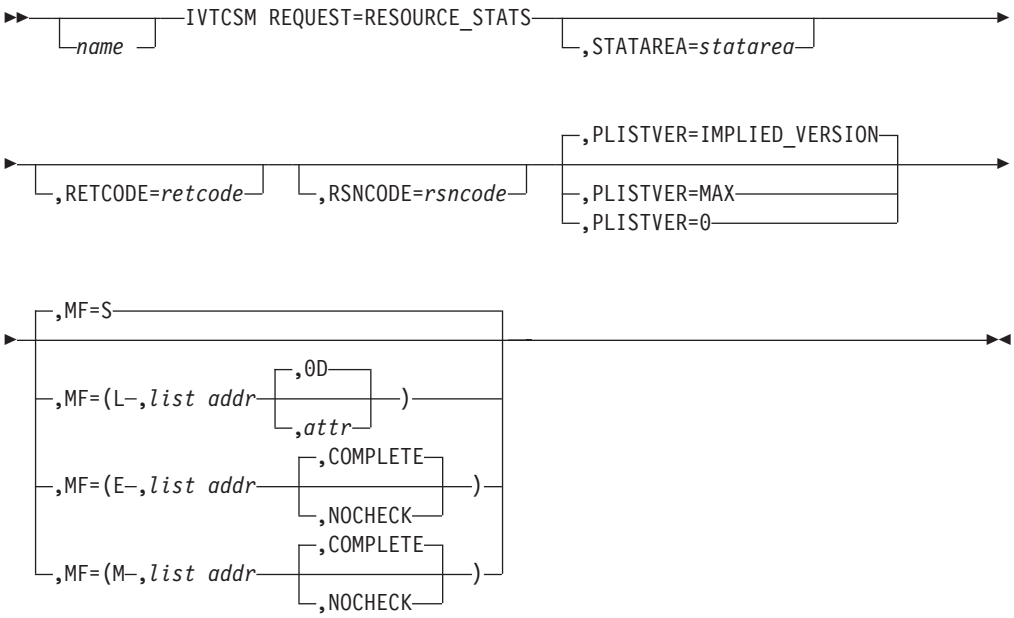
Usage

When this macroinstruction is issued, CSM returns the address of a 4-byte area containing the status of ECSA, data space, and fixed storage resources. Applications can issue this macroinstruction during initialization processing and use the address throughout normal processing. The status information contained in this area indicates whether the use of a resource is normal, constrained, or critical. If a resource usage is determined to be constrained or critical, users of CSM can take action to prevent critical shortages that might jeopardize the application's or system's operation, including:

- Selecting a different storage source for buffer pools
- Limiting usage of fixed storage

Syntax

main diagram



Parameters

The parameters are explained as follows:

name

An optional symbol, starting in column 1, that is the name on the IVTCSM macro invocation. The name must conform to the rules for an ordinary assembler language symbol.

,MF=

An optional input parameter that specifies the macro form.

Use MF=S to specify the standard form of the macro, which builds an inline parameter list and generates the macro invocation to transfer control to the service. MF=S is the default.

Use MF=L to specify the list form of the macro. Use the list form together with the execute form of the macro for applications that require reentrant code. The list form defines an area of storage that the execute form uses to store the parameters. Only the PLISTVER parameter may be coded with the list form of the macro.

Use MF=E to specify the execute form of the macro. Use the execute form together with the list form of the macro for applications that require reentrant code. The execute form of the macro stores the parameters into the storage area defined by the list form, and generates the macro invocation to transfer control to the service.

Use MF=M together with the list and execute forms of the macro for service routines that need to provide different options according to user-provided input. Use the list form to define a storage area; use the modify form to set the appropriate options; then use the execute form to call the service.

,*list addr*
The name of a storage area to contain the parameters. For MF=S, MF=E, and MF=M, this can be an RS-type address or an address in register (1)-(12).

,*attr*
An optional 1- to 60-character input string that you use to force boundary alignment of the parameter list. Use a value of 0F to force the parameter list to a word boundary, or 0D to force the parameter list to a doubleword boundary. If you do not code *attr*, the system provides a value of 0D.

,COMPLETE
Specifies that the system is to check for required parameters and supply defaults for omitted optional parameters.

,NOCHECK
Specifies that the system is not to check for required parameters and is not to supply defaults for omitted optional parameters.

IBM recommends that you use the modify and execute forms of IVTCSM in the following order:

1. Use IVTCSM ...MF=(M,list-addr,COMPLETE) specifying appropriate parameters, including all required ones.
2. Use IVTCSM ...MF=(M,list-addr,NOCHECK), specifying the parameters that you want to change.
3. Use IVTCSM ...MF=(E,list-addr,NOCHECK), to execute the macro.

,PLISTVER=
An optional input parameter that specifies the version of the macro. PLISTVER determines which parameter list the system generates. PLISTVER is an optional input parameter on all forms of the macro, including the list form. When using PLISTVER, specify it on all macro forms used for a request and with the same value on all of the macro forms. The values are:

- **IMPLIED_VERSION**, which is the lowest version that allows all parameters specified on the request to be processed. If you omit the PLISTVER parameter, IMPLIED_VERSION is the default.
- **MAX**, if you want the parameter list to be the largest size currently possible. This size might grow from release to release and affect the amount of storage that your program needs.

  If you can tolerate the size change, IBM recommends that you always specify PLISTVER=MAX on the list form of the macro. Specifying MAX ensures that

the list-form parameter list is always long enough to hold all the parameters you might specify on the execute form; in this way, MAX ensures that the parameter list does not overwrite nearby storage.

- **0**, if you use the currently available parameters.

To code: Specify one of the following:
- IMPLIED_VERSION
- MAX
- A decimal value of 0

,RETCODE=*retcode*
An optional output parameter into which the return code is to be copied from GPR 15.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,RSNCODE=*rsncode*
An optional output parameter into which the reason code is to be copied from GPR 0.

To code: Specify the RS-type address of a fullword field, or register (2)-(12).

,STATAREA=*statarea*
An optional output parameter that contains the address of an area containing the resource statistics mapped by IVTSTATA.

The information returned is in a non-fetch protected area and can be accessed while executing in any storage key.

To code: Specify the RS-type address, or address in register (2)-(12), of a pointer field.

Return Codes

The following codes can be returned to the application on this macroinstruction.

Return Code	Meaning
0	Request completed successfully.
4	Request did not complete successfully. See the following reason codes to determine the type of error encountered.

Reason Code	Meaning
2	Requested function not supported at the present time, service has not been initialized.

Appendix A. Return and Reason Codes for the IVTCSM Macroinstruction

This appendix describes return and reason codes that can be returned to an application issuing the IVTCSM macroinstruction. For all macroinstructions that invoke CSM, the application can examine return codes in register 15 and reason codes in register 0.

Return Code	Meaning
0	Request completed successfully.
4	Request did not complete successfully, see reason code to identify the type of error encountered.

Reason Code	Meaning
1	Requested function not supported.
2	Requested function not supported at the present time, service has not been initialized.
3	Specified buffer size is larger than supported size.
4	Buffer pool cannot be expanded to satisfy request.
5	No available buffers in pool, wait not requested.
6	Pool token specified is not valid.
7	Buffer token specified is not valid.
8	Instance ID in the input buffer token does not match that of the buffer, possible attempt to use a buffer that has been freed.
9	Real storage unavailable to provide a fixed buffer, wait not requested.
10	Request to make a buffer pageable denied, more than one image of the buffer exists.
11	A problem has been detected with the pool associated with the CSM request. The user should free all buffers when finished using them and issue a delete pool request to terminate usage of this pool. To allocate new buffers, a new pool must be created by issuing a new create pool request.
12	Address and length specified on a copy data request for a source buffer descriptor is outside the bounds of the CSM buffer represented by the specified pool token.
13	Address and length specified on a copy data request for a target buffer descriptor is outside the bounds of the CSM buffer represented by the specified pool token.
14	Copy operation resulted in truncation of source data due to insufficient buffer space provided by the target buffer list.
15	Assign buffer request failed because the state of the buffer is guaranteed to be pageable.
16	Instance ID in the input pool token does not match that of the user, possible attempt to allocate buffers after issuing a DELETE_POOL request.
17	Extent has been overlaid. Reissue the request.
18	BUFL_SOURCE value is not valid for an entry in the Source buffer list (SRCLIST).

19	BUFL_SOURCE value is not valid for an entry in the Target buffer list (TRGLIST).
20	BUFTYPE value specified is not valid for this request
21	BUFSOURC value is not valid for this request.
22	Source and target buffers overlap, no data has been copied.
23	Unable to create the specified pool. Creation of the pool would cause the ECSA maximum limit to be exceeded.
24	ASID specified on the OWNERID parameter is not active.

8 System error while processing the request

Reason Code	**Meaning**
1	Unable to obtain storage for request.
2	Schedule SRB fail for PC routine.
3	Unable to create ALET for data space.
4	Error encountered while creating the data space.
5	Unable to create another data space. Number of data spaces exceeds the maximum.
6	An abend occurred while processing this request.

Appendix B. CSM DSECTs

This appendix contains the CSM DSECTs. For general information on the use and purpose of DSECTs, refer to *z/OS Communications Server: SNA Programming*.

The DSECTs are shown as an abbreviated form of an assembler listing. The first column indicates the offsets within the DSECT and is the “LOC” column of an assembler listing. The object code, address columns and statement number columns of the listing, however, are not included. The source statements and comments are found next to the offset column. All numbers in the offset column are in hexadecimal.

CSM Buffer List Entry (IVTBUFL)

The DSECT IVTBUFL maps an entry in the CSM buffer list which can be indicated by the BUFLIST, SRCLIST or TARGLIST parameters on the IVTCSM macroinstruction. The buffer list pointed to by the BUFLIST parameter is required on the following IVTCSM requests:

- IVTCSM REQUEST=ASSIGN_BUFFER
- IVTCSM REQUEST=CHANGE_OWNER
- IVTCSM REQUEST=FIX_BUFFER
- IVTCSM REQUEST=FREE_BUFFER
- IVTCSM REQUEST=GET_BUFFER
- IVTCSM REQUEST=PAGE_BUFFER.

The buffer list pointed to by SRCLIST and TARGLIST is required on the IVTCSM REQUEST=COPY_DATA macroinstruction.

Figure 2 shows the format of the CSM buffer list.

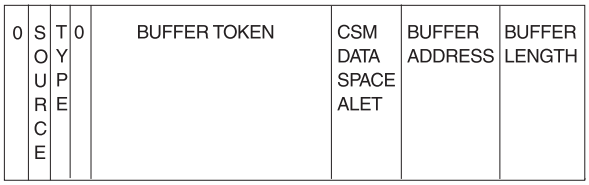


Figure 2. Example of Copy Data Buffer List and Copy Results

Byte (hex)
Contents

00 Version

01 Indicates the buffer source
- **X'80'** ECSA
- **X'40'** Data space
- **X'20'** User data space
- **X'10'** User storage area other than a data space

02 Indicates the state of the buffers
- **X'80'** Fixed
- **X'40'** Pageable
- **X'20'** Eligible to be page freed

03 0

04 - 0F Buffer token

10 - 13
ALET for the data space
14 - 17
Address of buffer
18 - 1B
Length of buffer

```
  LOC    SOURCE STATEMENT
000000 IVTBUFL  DSECT                          BUFFER DESCRIPTOR
000000 BUFL_VERSION   DS    X                  VERSION OF BUFFER DESCRIPTOR
       BUFL_VERSIONC  EQU   X'00'              VERSION 0
000001 BUFL_SOURCE    DS    X                  BUFFER SOURCE
       BUFL_CECSA     EQU   X'80'              INDICATES THAT THE STORAGE
       *                                       IS IN CSM ECSA
       BUFL_CDSPACE   EQU   X'40'              INDICATES THAT THE STORAGE
       *                                       IS IN CSM DATA SPACE
       BUFL_UDSPACE   EQU   X'20'              INDICATES THAT THE STORAGE
       *                                       IS IN A USER DATA SPACE
       BUFL_USTOR     EQU   X'10'              INDICATES THAT THE STORAGE
       *                                       IS A USER'S STORAGE OTHER THAN
       *                                       A DATA SPACE
000002 BUFL_TYPE      DS    X                  BUFFER TYPE
       BUFL_FIXED     EQU   X'80'              INDICATES THAT THE STORAGE IS
       *                                       IN A GUARANTEED TO BE FIXED
       *                                       STATE
       BUFL_PAGEABLE  EQU   X'40'              INDICATES THAT THE STORAGE IS
       *                                       IN A GUARANTEED TO BE PAGEABLE
       *                                       STATE
       BUFL_PAGEELIG  EQU   X'20'              INDICATES THAT THE STORAGE IS
       *                                       ELIGIBLE TO BE PAGEFREED BY
       *                                       CSM
000003                DS    XL1                RESERVED
000004 BUFL_TOKEN     DS    XL12               CSM BUFFER TOKEN
000010 BUFL_ALET      DS    F                  DATA SPACE ALET
000014 BUFL_ADDR      DS    A                  POINTER TO BUFFER
000018 BUFL_SIZE      DS    F                  THE SIZE OF THE ALLOCATED BUFFER
       *                                       ON GET_BUFFER REQUESTS, THE DATA
       *                                       LENGTH ON COPY_DATA REQUESTS
00001C BUFL_END       DS    0F                 END OF IVTBUFL
```

CSM Data Space Information (IVTDATSP)

IVTDATSP maps the information required to include CSM data space buffers in a user dump. The address of this information can be optionally returned to the user on the IVTCSM REQUEST=CREATE_POOL and IVTCSM REQUEST=DUMP_INFO macroinstructions.

Figure 3 describes the layout of the IVTDATSP DSECT.

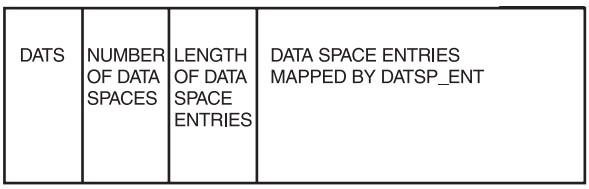


Figure 3. Example of Copy Data Buffer List and Copy Results

Byte (hex)	Field name	Contents
00—03	DATSP_ACRO	DATS
04—07	DATSP_SNUM	Number of data spaces

Byte (hex)	Field name	Contents
08—0B	DATSP_SLEN	Length of a data space information entry
0C—	DATSP_SINF	All of the data space entries. The number of entries is determined by DATSP_SNUM. Each entry is separately mapped by the DATSP_ENT DSECT and includes the following information:

Byte (hex)	Contents
00—07	STOKEN for the data space
08—0F	Data space name
10—	ALET for the data space

```
  LOC    SOURCE STATEMENT
000000 IVTDATSP DSECT                    CSM DATA SPACE INFORMATION
000000 DATSP_ACRO DS    CL4              Eyecatcher 'DATS'
000004 DATSP_SNUM DS    F                NUMBER OF DATA SPACES
000008 DATSP_SLEN DS    F                LENGTH OF A DATA SPACE
       *                                   INFORMATION ENTRY
00000C DATSP_SINF DS    5XL20            CONTAINS ALL THE DATA SPACE
       *                                   INFORMATION ENTRIES.  THESE
       *                                   ENTRIES ARE MAPPED BY THE
       *                                   DATSP_ENT DSECT.
       *                                   THERE WILL BE ONE ENTRY FOR
       *                                   EACH DATA SPACE INDICATED BY
       *                                   DATSP_SNUM, AND EACH ENTRY
       *                                   MUST BE SEPARATELY MAPPED BY
       *                                   THE DATSP_ENT DSECT.
000000 DATSP_ENT  DSECT                  DATA SPACE INFORMATION ENTRY
000000 DATSP_TOKN DS    XL8              STOKEN FOR THE DATA SPACE
000008 DATSP_NAME DS    XL8              DATA SPACE NAME
000010 DATSP_ALET DS    F                ALET FOR THE DATA SPACE
```

CSM Resource Status Area (IVTSTATA)

IVTSTATA maps the information required to monitor the usage of CSM resources such as ECSA, data space and fixed storage. The address of the information can be optionally returned to the user on the IVTCSM REQUEST=CREATE_POOL and IVTCSM REQUEST=RESOURCE_STATS macroinstructions.

For each resource type, two bits are defined: one to indicate the usage of the resource is constrained and one to indicate the usage is critical. If neither bit is set, the usage of the resource is considered to be normal. This allows the users of CSM to take action based on resource usage to prevent critical shortages that might jeopardize the application's or system's operation. Possible user actions might include selecting a different storage source for buffer pools or limiting usage of fixed storage. For information on other actions that an installation may consider to resolve resource shortages, see "Monitoring CSM" on page 2.

```
  LOC    SOURCE STATEMENT
000000 IVTSTATA DSECT                    CSM resource status area
000000 STATA_ACRO  DS    CL4             Eyecatcher 'STAT'
000004 STATA_LEN   DS    XL2             Number of bytes of resource
       *                                   statistics
000006 STATA_FLAG  DS    X               Status flag
       STATA_ESTAT EQU   X'C0'           ECSA storage status
       STATA_ECRIT EQU   X'80'           ECSA storage critical
       STATA_ECONS EQU   X'40'           ECSA storage constrained
       *
       STATA_DSTAT EQU   X'30'           Data space storage status
       STATA_DCRIT EQU   X'20'           Data space storage
```

```
                *                                       critical
                STATA_DCONS EQU   X'10'                 Data space storage
                *                                       constrained
                *
                STATA_FSTAT EQU   X'0C'                 Fixed storage status
                STATA_FCRIT EQU   X'08'                 Fixed storage critical
                STATA_FCONS EQU   X'04'                 Fixed storage constrained
000007          DS    X                                 Reserved
```

Appendix C. How to Read a Syntax Diagram

The syntax diagram shows you how to specify a command so that the operating system can correctly interpret what you type. Read the syntax diagram from left to right and from top to bottom, following the horizontal line (the main path).

Symbols and Punctuation

The following symbols are used in syntax diagrams:

►► Marks the beginning of the command syntax.

► Indicates that the command syntax is continued.

I Marks the beginning and end of a fragment or part of the command syntax.

►◄ Marks the end of the command syntax.

You must include all punctuation such as colons, semicolons, commas, quotation marks, and minus signs that are shown in the syntax diagram.

Parameters

The following types of parameters are used in syntax diagrams.

Required
Required parameters are displayed on the main path.

Optional
Optional parameters are displayed below the main path.

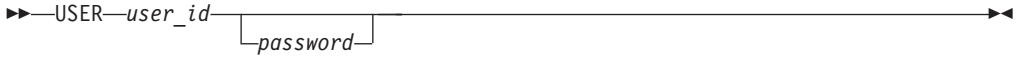
Default
Default parameters are displayed above the main path.

Parameters are classified as keywords or variables. Keywords are displayed in uppercase letters and can be entered in uppercase or lowercase. For example, a command name is a keyword.

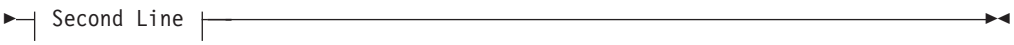
Variables are italicized, appear in lowercase letters, and represent names or values you supply. For example, a data set is a variable.

Syntax Examples

In the following example, the USER command is a keyword. The required variable parameter is *user_id*, and the optional variable parameter is *password*. Replace the variable parameters with your own values.



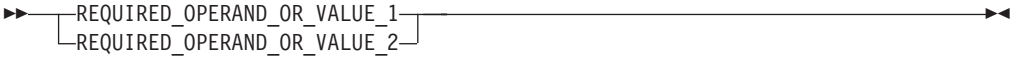
Longer than one line: If a diagram is longer than one line, the first line ends with a single arrowhead and the second line begins with a single arrowhead.



Required operands: Required operands and values appear on the main path line.

You must code required operands and values.

Choose one required item from a stack: If there is more than one mutually exclusive required operand or value to choose from, they are stacked vertically in alphanumeric order.



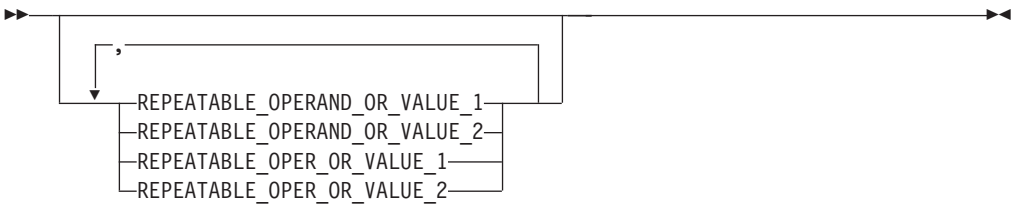
Optional values: Optional operands and values appear below the main path line.

You can choose not to code optional operands and values.

Choose one optional operand from a stack: If there is more than one mutually exclusive optional operand or value to choose from, they are stacked vertically in alphanumeric order below the main path line.

Repeating an operand: An arrow returning to the left above an operand or value on the main path line means that the operand or value can be repeated. The command means that each operand or value must be separated from the next by a comma.

Selecting more than one operand: An arrow returning to the left above a group of operands or values means more than one can be selected, or a single one can be repeated.



If an operand or value can be abbreviated, the abbreviation is described in the text associated with the syntax diagram.

Case Sensitivity: VTAM commands are not case sensitive. You can code them in upppercase or lowercase.

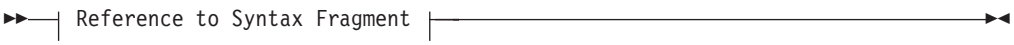
Nonalphanumeric characters: If a diagram shows a character that is not alphanumeric (such as parentheses, periods, commas, and equal signs), you must code the character as part of the syntax. In this example, you must code OPERAND=(001,0.001).

Blank spaces in syntax diagrams: If a diagram shows a blank space, you must code the blank space as part of the syntax. In this example, you must code OPERAND=(001 FIXED).

Default operands: Default operands and values appear above the main path line. VTAM uses the default if you omit the operand entirely.

Variables: A word in all lowercase italics is a *variable*. Where you see a variable in the syntax, you must replace it with one of its allowable names or values, as defined in the text.

Syntax fragments: Some diagrams contain syntax fragments, which serve to break up diagrams that are too long, too complex, or too repetitious. Syntax fragment names are in mixed case and are shown in the diagram and in the heading of the fragment. The fragment is placed below the main diagram.



Syntax Fragment:

References to syntax notes appear as numbers enclosed in parentheses above the line. Do not code the parentheses or the number.

Notes:

1 An example of a syntax note.

Appendix D. Information Apars

This appendix lists information apars for IP and SNA books.

Notes:

1. Information apars contain updates to previous editions of the manuals listed below. Books updated for V1R2 are complete except for the updates contained in the information apars that may be issued after V1R2 books went to press.
2. Information apars are predefined for z/OS V1R2 Communications Server and may not contain updates.

IP Information Apars

Table 3 lists information apars for IP books.

Table 3. IP Information Apars

Title	z/OS CS V1R2	CS for OS/390 2.10 and z/OS CS V1R1	CS for OS/390 2.8	CS for OS/990 2.7	CS for OS/390 2.6	CS for OS/390 2.5
IP API Guide	ii12861	ii12371	ii11635	ii11558	ii11405	ii11144
IP CICS Sockets Guide	ii12862		ii11626	ii11559	ii11406	ii11145
IP Configuration			ii11620 ii12068 ii12353 ii12649	ii11555 ii11637 ii11995 ii12325	ii11402 ii11619 ii12066 ii12455	ii11159 ii11979 ii12315
IP Configuration Guide	ii12498	ii12362 ii12493				
IP Configuration Reference	ii12499	ii12363 ii12494 ii12712				
IP Diagnosis	ii12503	ii12366 ii12495	ii11628	ii11565	ii11411	ii11160 ii11414
IP Messages Volume 1	ii12857	ii12367	ii11630	ii11562	ii11408	ii11636
IP Messages Volume 2	ii12858	ii12368	ii11631	ii11563	ii11409	ii11281
IP Messages Volume 3	ii12859	ii12369	ii11632 ii12883	ii11564 ii12884	ii11410 ii12885	ii11158
IP Messages Volume 4	ii12860					
IP Migration	ii12497	ii12361	ii11618	ii11554	ii11401	ii11204
IP Network Print Facility	ii12864		ii11627	ii11561	ii11407	ii11150
IP Programmer's Reference	ii12505		ii11634	ii11557	ii11404	ii12496

Table 3. IP Information Apars (continued)

Title	z/OS CS V1R2	CS for OS/390 2.10 and z/OS CS V1R1	CS for OS/390 2.8	CS for OS/990 2.7	CS for OS/390 2.6	CS for OS/390 2.5
IP and SNA Codes	ii12504	ii12370	ii11917	Added TCP/IP codes to VTAM codes V2R6 ii11611	ii11361	ii11146 ii11097
IP User's Guide		ii12365	ii11625	ii11556	ii11403	ii11143
IP User's Guide and Commands	ii12501					
IP System Admin Guide	ii12502					
Quick Reference	ii12500	ii12364				

SNA Information Apars

Table 4 lists information apars for SNA books.

Table 4. SNA Information Apars

Title	z/OS CS V1R2	CS for OS/390 2.10 and z/OS CS V1R1	CS for OS/390 2.8	CS for OS/390 2.7	CS for OS/390 2.6	CS for OS/390 2.5
Anynet SNA over TCP/IP			ii11922	ii11633	ii11624	ii11623
Anynet Sockets over SNA			ii11921	ii11622	ii11519	ii11518
CSM Guide						
IP and SNA Codes		ii12370	ii11917	ii11611	ii11361	ii11097
SNA Customization	ii12872	ii12388	ii11923	ii11925 ii12008	ii11924 ii12007	ii11092 ii11621 ii12006
SNA Diagnosis	ii12490	ii12389	ii11915	ii11615	ii11357	ii11585
SNA Messages	ii12491	ii12382	ii11916	ii11610	ii11358	ii11096
SNA Network Implementation Guide	ii12487	ii12381	ii11911	ii11609 ii12683	ii11353 ii11493	ii11095
SNA Operation	ii12489	ii12384	ii11914	ii11612	ii11355	ii11098
SNA Migration	ii12486	ii12386	ii11910	ii11614	ii11359	ii11100
SNA Programming		ii12385	ii11920	ii11613	ii11360	ii11099
Quick Reference	ii12500	ii12364	ii11913	ii11616	ii11356	
SNA Resource Definition Reference	ii12488	ii12380 ii12567	ii11912 ii12568	ii11608 ii12569	ii11354 ii12259 ii12570	ii11094 ii11151 ii12260 ii12571
SNA Resource Definition Samples						

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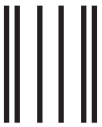

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