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# IBM® z/VM® z/Architecture® CMS

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## Overview of z/Architecture CMS

z/Architecture CMS is **shipped as a sample program**, starting with z/VM version 5 release 3, with **no formal support available**.

You can use the shipped sample z/Architecture CMS to experiment with z/Architecture capabilities in CMS and to help IBM gather information about problems that occur in this environment. While no formal support is available for z/Architecture CMS, you can forward your comments or any problems found experimenting with it to IBM z/VM development by using 'Contact z/VM' in the left navigation on the z/VM Web pages or by contacting the IBM Support Center and opening a low priority, information only problem record.

z/Architecture CMS runs in z/Architecture 31-bit addressing mode and enables the use of z/Architecture instructions, including those that operate on 64-bit registers, by CMS programs, while permitting most existing ESA/390-architecture CMS programs to continue to function without change.

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## z/Architecture CMS Specifications

### 64-Bit Addressing Mode

z/Architecture CMS does not exploit or explicitly support 64-bit addressing mode (e.g. by allowing AMODE 64 on GENMOD) but it does not impose serious restrictions on programs that enter 64-bit addressing mode themselves.

### Storage

z/Architecture CMS does not directly exploit storage above 2G. However, on z/VM V5.3 and higher, it can be IPLed in a virtual machine with more than 2G of storage and programs can use subpool DMSUSERG to allocate storage only above 2G. The number of pages of storage to be allocated is specified using the BYTES operand of the CMSSTOR macro. For example

```
CMSSTOR OBTAIN, BYTES=1, SUBPOOL='DMSUSERG'
```

will allocate one page of storage above 2G. The storage allocated above 2G is aligned on a page boundary. The 64-bit address of the allocated storage is returned in general-purpose register 1.

The REXX Storage() function will accept an address that is up to 16 hexadecimal digits long and thus may be used to obtain the 64-bit storage size and to examine and alter CMS storage using 64-bit addresses.

Execution of programs above 2G is not supported by CMS interruption handlers.

In a virtual machine with more than 2047MB of storage, CMS does not use the megabyte at 2047M.

### Large Registers

The high-order halves of the general-purpose registers are for the most part not used by CMS, but they are saved and restored across interruptions and are provided to application programs by interruption handling interfaces such as the one provided by HNDEXT.

## NUCON

NUCON, the CMS Nucleus Constants area, has been redesigned to accommodate the requirements of z/Architecture, including new PSW locations and an 8K prefix area. Programs that usurp 390 Architecture fields may not function correctly. However, programs that steal CMS 390 Architecture PSWs should work as expected.

## Mapping Files

In addition to NUCON, several other mapping MACRO and COPY files have been updated, including DBGSECT, EXTSECT, EXTUAREA, IHAEPIE, IHASDWA, IOSECT, PGMSECT, PSA, STRUCPRA, SVCSAVE, SVCSECT and USERSAVE. Programs that refer to these data areas might need to be recompiled.

## XC Mode

CP does not support XC-mode z/Architecture machines, so data spaces and associated applications that require them are not supported.

## Diagnose Support

Some Diagnose instructions are not enabled for use by a z/Architecture virtual machine. While this is not a CMS issue, it may affect the operation of some CMS programs.

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## Packaging

The z/Architecture CMS nucleus and associated files are shipped on the MAINT 990 minidisk. The nucleus file is ZCMS LOADDECK and its map is ZCMS NUCMAP. A macro library, ZCMS MACLIB, containing the updated MACRO and COPY files is also provided on this minidisk.

The z/Architecture CMS nucleus is shipped as an IPLable nucleus off of the MAINT 990 minidisk. It is also shipped as a predefined named saved system segment, ZCMS. For z/Architecture CMS the 'S' disk is still the MAINT 190 minidisk.

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## How to Use

To use z/Architecture CMS you can IPL the predefined NSS, ZCMS, or you can LINK to the MAINT 990 minidisk and then IPL 990. To IPL 990 you need at least 20M of virtual storage.

If you have programs that have dependencies on control blocks changed by z/Architecture CMS (refer to 'Mapping Files' above) you will need to re-assemble those programs. To do that you need to LINK and ACCESS MAINT's 990 minidisk and specify ZCMS ahead of other libraries in the list of MACLIBs (e.g., as defined by a GLOBAL MACLIB command or on the TEXT MACS statement in a CNTRL file) to be used by the Assembler.

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## Place the Serviced z/Architecture CMS Into Production

It is possible that the shipped ZCMS nucleus, ZCMS LOADDECK, along with ZCMS NUCMAP, might be serviced. If so then you need to follow these extra service instructions in order to place the new serviced IPLable ZCMS nucleus on the MAINT 990 minidisk and to rebuild the ZCMS named saved system.

You can also use these instructions if you need to replace the IPLable copy of the ZCMS nucleus on the MAINT 990 minidisk or rebuild the ZCMS saved system. (Note, in this case you can skip step 2.)

**1** Logon to MAINT.

**2** Check to see if ZCMS LOADDECK has been serviced

```
xedit $vmfsrv $msglog
set case m i
set zone 1 *
locate /zcms.loaddeck
```

If you did not use the SERVICE command to apply the service then you need to XEDIT the VMFBLD message log, \$VMFBLD \$MSGLOG.

**3** Access the CMS disks.

```
vmfsetup zvm cms
```

**4** Place the ZCMS nucleus on the MAINT 990 disk using the ZCMSBLD EXEC.

```
zcmsbld
```

Following is an example of what you will see on the console from the ZCMSBLD EXEC. Note that you will have to press the ENTER key to complete the IPL 00C CLEAR, when the EXEC goes in to a VM READ.

```

zcmsbld
Setting up virtual PUNCH for z/CMS load deck.
... CP SPOOL PUNCH * CLASS I NOCONT NOHOLD

Setting up virtual READER for z/CMS load deck.
... CP SPOOL READER CLASS I

Accessing zCMS minidisk as filemode T

Adjusting zCMS load deck nucleus area to match 990

Putting zCMS load deck in virtual reader.
... PUNCH ZCMS LOADDECK A3 ( NOHEADER
RDR FILE 0554 SENT FROM MAINT    PUN WAS 0554 RECS 138K CPY 001 I NOHOLD
==> Loading zCMS load deck via IPL file in virtual READER
==> The virtual PUNCH and READER will be reset to their
==> initial state when the IPL completes.
==>
==> Once the IPL completes, the nucleus is written to the
==> 990 minidisk. The zCMS nucleus load map is in your
==> virtual printer queue. You can PURGE this printer
==> file as it is identical to the ZCMS NUCMAP on the 990
==> minidisk.
==>
==> To complete the build of the zCMS nucleus, issue
==>
==>     SAMPNSS ZCMS
==>
==> after the next "Ready;" message appears. When the
==> SAMPNSS completes, issue the command
==>
==>     CP IPL 990  PARM SAVESYS ZCMS

Now loading the zCMS nucleus ...
... CP IPL 00C CLEAR

z/CMS Vn.n.n  2008-09-12 17:35

<goes into VMREAD so you need to press ENTER here>

Ready; T=0.01/0.01 17:36:11

```

## 5 Rebuild the ZCMS Saved System.

**Note:** The address on the IPL command is **990**.

**vmfsetup zvm cms**  
**sampnss zcms**  
**ipl 990 clear parm savesys zcms**

Note that you will have to press the ENTER key to complete the IPL it goes in to a VM READ.

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