

CA IDMS™ and Exploitation of the zIIP

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Abstract

- CA IDMS has the capability to exploit the IBM zIIP specialty engine on the System Z. Attend this session to learn how this feature can be used to offload CA IDMS computing cycles to zIIPs enabling increased workloads on your existing CP.

Agenda

- 1 TERMS AND DEFINITIONS
- 2 BENEFITS
- 3 OPERATIONAL CONSIDERATIONS
- 4 ZIIP EXPLOITATION
- 5 IMPLEMENTING VIA CA IDMS STARTUP PARAMETERS
- 6 ELIGIBILITY AND REQUIREMENTS

Terms and Definitions

- zIIP
 - IBM System z Integrated Information Processor
- CP or GP
 - General Purpose Processor
- TCB
 - Operating System Task Control Block
 - Runs on CP/GP
- SRB
 - Operating System Service Control Block
 - Runs on zIIP

Terms and Definitions

- Enclave
 - An enclave is a representation of a business transaction or unit of work
- TCO
 - Total cost of ownership
- White Space
 - CP CPU cycles made available by moving processing to a zIIP processor



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Benefits

- Cost/benefit tradeoff
 - Sites with zIIP capacity
 - Sites nearing CP capacity
 - Cost to add a zIIP versus cost to add a CP
 - Hardware (zIIP is less)
 - Software licensing fees (zIIP is none)
 - Benefit of zIIP versus CP
 - Depends on how much workload can be offloaded to zIIP



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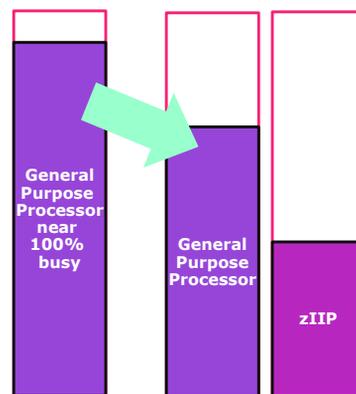
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Benefits

- Testing has shown benefits for all CA IDMS workloads and environments
 - CICS, CA ADS™, DC COBOL, CA IDMS™ Server, etc
 - As well as varying mixtures of the above workloads and environments

zIIP Exploitation

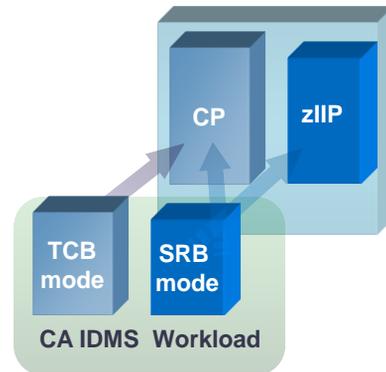
- Why zIIPs?
 - Cheaper than general purpose processors
 - No software charges for zIIP capacity
 - Offloading cycles to zIIP frees cycles on CP for additional work
 - Defer processor upgrades
 - Increase throughput



Increase White Space on CPs

CA IDMS zIIP Exploitation

- 100% of zIIP eligible work is offloaded to zIIP processors
 - 18.0 – RO63129
 - 18.5 – RO63736



Implementing via CA IDMS Startup Parameters

- Startup parameters
 - zIIP=Y
 - Use the zIIP feature
 - zIIP=N
 - Do not use the zIIP feature
 - Default if zIIP parameter is omitted

Impact on Existing Dialogs and Programs

- None
 - All existing dialogs, programs of any language, will run in an environment containing zIIP processors without change or impact
 - Other than an overall reduction in CP CPU usage



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Eligibility and Requirements

- Loading of nucleus module, line drivers, service drivers, RHDCUXIT from authorized libraries
- Additional authorized libraries
 - Load module executed to start CA IDMS CV must reside in an authorized library
 - CA IDMS nucleus modules must be loaded from an authorized library
 - IBM LE library must be authorized and in the CDMSLIB concatenation
 - z/OS Callable Services library must be in linklist or authorized and included in STEPLIB



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Eligibility and Requirements

- Individual nucleus members in a load library do not have to be authorized
 - Not every load library in CA IDMS startup STEPLIB/CDMSLIB needs to be authorized
- To ensure all nucleus modules are loaded from an authorized library
 - Authorize the SMP/E target load library or
 - Manually copy all modules in the SMP/E target load library to an authorized library



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Eligibility and Requirements

- Detailed messages for errors
 - IDMS DC016106 ZIIP=N forced. Module nnnnnnnn was loaded from an unauthorized library.
 - DDN=ddddddd VOLSER=vvvvvv DSN=dsname
- Linklist and LPA assumed authorized unless coded in JCL



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Eligibility and Requirements

- All system mode work is eligible except:
 - Physical I/O
 - User-written exits
 - User-written Database procedures
 - IDMSCOMP, IDMSDCOM, PRESSPACK are zIIP eligible
 - SQL-invoked routines
 - SVC Processing
- User mode code is not eligible to run on zIIP
 - ADS, COBOL, User-written HLASM and PL1
 - Causes a 'swap' to TCB mode



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Swaps

- Swapping uses additional CPU cycles
- Changing from TCB mode to SRB mode
- Changing from SRB mode to TCB mode
- Requires a call to the IBM Workload Manager (WLM)
- IDMS is not allowed to run any user code in SRB mode
 - IDMS keeps track of the mode its currently in
 - Before dispatching in user-mode
 - Call WLM to switch to TCB mode
 - User program completes and requests another IDMS service
 - Call WLM to switch to SRB mode



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Reducing Swaps

- All user written exits cause IDMS to swap before and after being invoked
 - Remove any exits that are not required
- Reduce the number of physical I/O
 - Increase size of database buffers

Reducing Swaps

* SYSTEM/USER EXITS *						
EXIT NUMBER	DEFINED	MODE	CALL CONVENTIONS	NEED TO LOAD	AMODE	ENTRY POINT/ MODULE NAME
017	YES	SYSTEM	DC	NO	ANY	003EDEA4
018	YES	SYSTEM	DC	NO	ANY	003EDF00

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Reducing Swaps

```

* Named User Exits *
EXIT      ENTRY      EXIT      ENTRY
NAME     DEFINED   POINT    NAME     DEFINED   POINT
-----
BTCIDXIT NO        00000000 DBLUEREX NO        00000000
IDDEXITB NO        00000000 IDDEXITO NO        00000000
IDMSAJNX NO        00000000 IDMSCLCX NO        00000000
IDMSDPLX YES      00020DF0 IDMSIOXT NO        00000000
IDMSIOX2 NO        00000000 IDMSJNL2 NO        00000000
OLQDMLX  NO        00000000 SCHEXITB NO        00000000
SCHEXITO NO        00000000 SGNEXITB NO        00000000
SGNEXITO NO        00000000 SUBEXITB NO        00000000
SUBEXITO NO        00000000 TCKREXIT NO        00000000
USRIDXIT NO        00000000 WITEXIT  NO        00000000
WTOEXIT  NO        00000000 WTOREXIT NO        00000000
    
```

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Where are Swaps coming from

```

D SUBT
*** Display all subtasks ***
Work
Name  Nr  type  Status  Task dispatch  Wakeup count  Total CPU time
-----
MAINTASK 01 IDMS IDLE      1,998          1,645      00:00.402114
SUBT0001 02 IDMS IDLE           00           00      00:00.000000
SUBT0002 03 IDMS IDLE           00           00      00:00.000000
SUBT0003 04 IDMS IDLE           03           01      00:00.000205
SUBT0004 05 IDMS BUSY          172           83      00:00.022336

CHGEMODE table display
Address  Program  Offset  Call cnt  TCB->SRB  SRB->TCB
-----
400F5ECE RHDCAIT  000030CE 1          1          0
409AA07E RHDCTSKI 0000057E 16         0          16
409A205C RHDCMSTR 0000015C 1          1          0
4097F35A RHDCTL   00001B5A 45         0          45
4097F406 RHDCTL   00001C06 45         45         0
4090374A RHDDBRC  0000014A 1          1          0
00023C06 OCEP2    00000076 1616       0          1616
00023D4C OCEP2    00000E3C 1616       1616       0
40091E5E IDMSDBIO 00000E5E 24         0          24
40091F26 IDMSDBIO 00000F26 24         24         0
409C0CC2 RHDCMODE 000004C2 37         0          37
409C0E02 RHDCMODE 00000602 37         37         0
    
```

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Where are Swaps coming from

4097F646	RHDCNTL	00001E46	1	0	1
4097F6D2	RHDCNTL	00001ED2	1	1	0
409AF0FC	IDMSSERV	000010FC	1	0	1
409AFD54	IDMSSERV	00001154	1	1	0
409AFE90	IDMSSERV	00001290	1	0	1
409AFEE4	IDMSSERV	000012E4	1	1	0
0000C3DA	DCBLDL	00000072	24	0	24
0000C91C	DCBLDL	000005B4	24	24	0
0000CA5C	DCLOAD	0000006C	24	0	24
0000D002	DCLOAD	00000612	24	24	0
0001B4AC	PRODCHK	0000010C	1	0	1
0001B042	PRODCHK	000004A2	1	1	0
400CD12E	IDMSDBMS	0001912E	74	0	74
400CD19E	IDMSDBMS	0001919E	74	74	0
0000E40	GETDSNS	00000066	1	0	1
0000EFA	GETDSNS	00000110	1	1	0
000120B4	HCHECK	00000060	5	0	5
00012270	HCHECK	0000022C	5	5	0
413AB5F0	RHDCRUSD	000001F0	6	6	0
C13ABF54	RHDCLGSD	00000154	3	3	0
400F35AE	RHDCNAIT	00000FAE	486	243	243
0030EF4E	RHDCPCBO	0000034E	1	0	1
0030F240	RHDCPCBO	00000640	1	1	0
40942392	RHDCSNAP	00000192	3	0	3
413B743C	RHDCDEAD	0000043C	1	1	0
409BCD4A	RHDCSTAT	0000014A	1	0	0
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Informational Messages

- If zIIP processors are present and zIIP=NO is specified or taken as the default
 - Displayed on the JES log very early in the startup process

+IDMS DC016105 02 zIIP processors detected. You should consider using zIIP=Y.

Unitasking or Multitasking

- zIIP feature works with both Unitasking and Multitasking
- Unitasking
 - 1 Enclave started for the single TCB (SCA) to be used
- Multitasking
 - 1 Enclave started for each TCB (SCA) to be used
 - Doesn't depend upon the number of zIIPs installed
 - If 6 subtasks are started for multitasking and only 1 zIIP engine is available on the machine, 6 enclaves are started

19.0 Enhancements

- DCMT V ZIIP ONLINE/OFFLINE
 - Can dynamically disable the use of zIIP engines
 - CV must be started with ZIIP=Y
- Re-Enable ZIIP after disabled by a non-authorized Nucleus Module
 - RO93622
 - CV must be started with ZIIP=Y
 - All required Nucleus Modules must have been authorized at startup

19.0 Enhancements

- Reduce zIIP overhead for DB exits
 - RO83713
 - New SYSIDMS Parameters
 - EXIT14_BATCH_RU - Restricts the calling of EXIT14 to batch run-units.
 - RETRIEVAL_CV - IDMS will convert READY UPDATE requests to READY RETRIEVAL when accessing an area set to RETRIEVAL mode.
 - SUPPRESS_RECORD_ON_STATUS - When an AFTER GET DB procedure suppresses a record occurrence, the code it returns can now be defined so that IDMS will reissue most verbs so the application program does not have to.



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Monitor zIIP Usage and Status

- DCPROFIL – Displays the status of zIIP
 - ZIIP=Y
 - zIIP is enabled and being used
 - ZIIP=N
 - zIIP is disabled. CV started with ZIIP=N or ZIIP could not start
 - ZIIP=S
 - zIIP is stopped. zIIP usage has been varied offline
 - ZIIP=U
 - zIIP has been forced off
 - A nucleus module has been loaded from an unauthorized library



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Monitor zIIP Usage and Status

```

TAPE:                GJJ04I                NUMBER OF SCTS:      0004
                                                                OPERATING SYSTEM:   z/OS   ZIIP=Y
                                                                ZIIP ENGINES:      0008
                                                                TRACE SAVE: OFF (DDLDLOG)
SYSTEM TRACE:        YES
CHA SIZE:            0000000000
                                                                DMCL TABLE:        R185DMCL
                                                                PRIMARY STORAGE
                                                                PROTECT KEY:        04
SCRATCH HMM          0000000000
                                                                ACTIVE TRANSACTION
                                                                COUNT:              0009
SIZE OF XA
STORAGE AREA:        0100994560
                                                                SECURITY
                                                                SECURITY SYSTEM: CA TOP SECRET
                                                                SIGNON SECURITY: OFF
QUEUE AREA
LOW PAGE:            0000040001
HIGH PAGE:           0000041000
                                                                SVC NUMBER:          172
DC VERSION ID:       0129
                                                                GETMAIN SUBPOOL:    001
USER TRACE BUFFERS: 0253
                                                                PAGE 00001 - NEXT PAGE:
    
```

Monitor zIIP Usage and Status

```

D SUBTASK EFF
*** Subtask display ***
Subtask      Elapsed time      Total CPU time      % CPU   SRB
Name         TCB          SRB          TCB          SRB      TCB  SRB
-----
MAINTASK     00:03.046204  00:00.113316  00:00.296251  00:00.063116  09  55  Y
SUBT0001     00:00.009648  00:00.001276  00:00.002721  00:00.000660  28  51  Y
SUBT0002     00:04.968577  00:00.125625  00:00.517187  00:00.066233  10  52  Y
-----
Totals       00:08.024429  00:00.240217  00:00.816160  00:00.130010  10  54
V23  ENTER NEXT TASK CODE:      CA IDMS release 18.0 tape GJ100B node SYST0023
    
```

Test without zIIP

```

D STAT SYS
13:04:04.46 10/120 Current Time
13:02:01.48 10/120 Startup Time

TASKS:      53464 Processed
            29 System
            6 Deadlocks

TRANS:      53474 Processed
            53432 Ext Proc
            0 Dist Proc

DATABASE:   656055 Calls
            0 Buff Wait
            100962 Page Writ
            635102 Tot Locks

INDEX:      0 SR0 Splits
            0 SR0 Spawns
            0 Orph Adopt

SQL:        0 Commands
            0 AM Recomp

            34 Abended
            0 Runaway
            3 Dead Victims
            73 Max Tasks
            0 Times At Max

            53425 Norm Cmp
            53398 Ext Norm
            0 Dist Norm
            54 Max Conc
            20 Ext Conc
            0 Dist Conc
            25 Max Erus

            395509 Pages Rqst
            33756 Pages Read
            0 Calc Noflo
            0 Calc Ovflo
            0 Frag Stord
            0 SR0 Stores
            0 SR0 Erases
            0 Ix Searches
            0 Lvl1 Srchd
            0 Tupls Fetched
            0 Rows Updated
            0 Sorts
            0 Tuples Sorted

            647457 Recs Rqst
            218206 Recs Cur R/U
            53413 Via Noflo
            0 Via Ovflo
            0 Recs Reloc
            0 SR7 Stores
            0 SR7 Erases
            0 Min Level
            0 Max Level
            0 Rows Inserted
            0 Rows Deleted
            0 Sort Min
            0 Sort Max

PAGE 00001 - NEXT PAGE:
    
```

Test With zIIP

```

D STAT SYS
13:07:20.29 10/120 Current Time
13:06:06.27 10/120 Startup Time

TASKS:      47922 Processed
            27 System
            6 Deadlocks

TRANS:      47936 Processed
            47893 Ext Proc
            0 Dist Proc

DATABASE:   570112 Calls
            0 Buff Wait
            97626 Page Writ
            746400 Tot Locks

INDEX:      0 SR0 Splits
            0 SR0 Spawns
            0 Orph Adopt

SQL:        0 Commands
            0 AM Recomp

            46 Abended
            0 Runaway
            3 Dead Victims
            73 Max Tasks
            0 Times At Max

            47872 Norm Cmp
            47847 Ext Norm
            0 Dist Norm
            54 Max Conc
            20 Ext Conc
            0 Dist Conc
            25 Max Erus

            347795 Pages Rqst
            32285 Pages Read
            0 Calc Noflo
            0 Calc Ovflo
            0 Frag Stord
            0 SR0 Stores
            0 SR0 Erases
            0 Ix Searches
            0 Lvl1 Srchd
            0 Tupls Fetched
            0 Rows Updated

            559667 Recs Rqst
            192726 Recs Cur R/U
            47660 Via Noflo
            0 Via Ovflo
            0 Recs Reloc
            0 SR7 Stores
            0 SR7 Erases
            0 Min Level
            0 Max Level
            0 Rows Inserted
            0 Rows Deleted

            00:25.248251 Tot System Time
            00:00.000165 Tot User Time
            00:13.035569 zIIP on zIIP Time
            00:00.053047 zIIP on CP Time
            617,096 Number of Swaps

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```

Feedback From Clients

- Reported offloading over 90% of GP CPU cycles to the zIIP
 - CICS frontend to IDMS backend
- Clients have supported reductions in CPU using ADS/COBOL under DC



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Summary

- One time cost
- Creates 'white space' on the GP
- Must meet authorization requirements
- Avoid swaps where possible



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Comments:					
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Comments:					
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