

MAXDBAT and CONDBAT, what is the best value I should set them to?

New England Db2 Users Group
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Db2 for z/OS software development (DDF)

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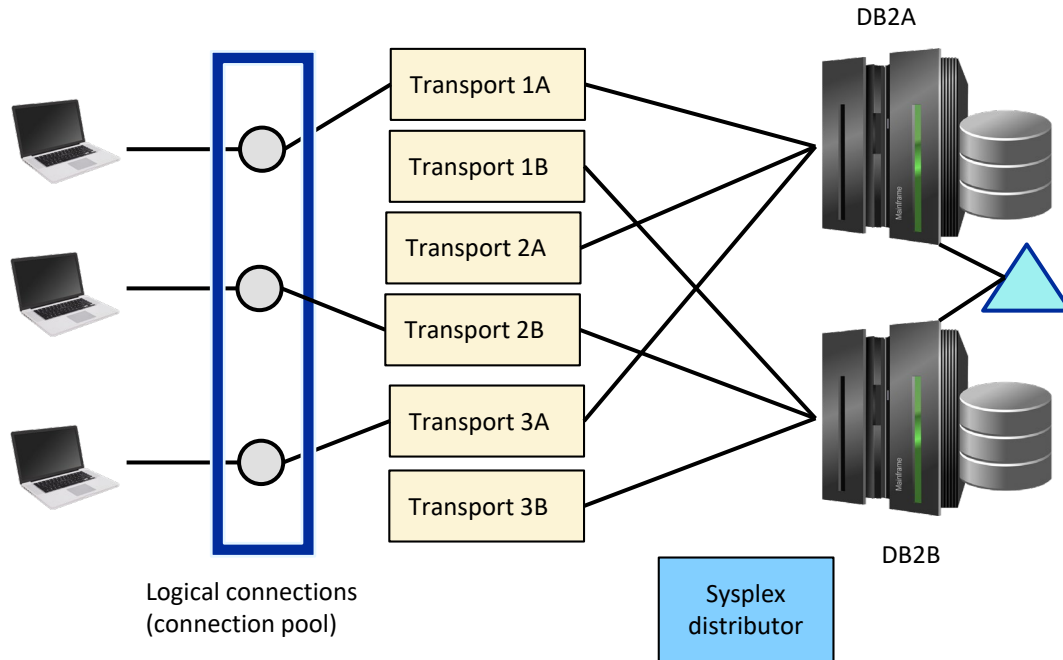
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Agenda

- Sysplex WLB, connections, and threads
- MAXDBAT, CONDBAT, MAXCONQN, MAXCONQW
- IFCID 255 class 6 statistics data
- Determining MAXDBAT setting
- Learning about distributed activity in your Db2 system
- Know your remote clients
- Controlling your threads and connections
- Best practices
- Q & A
- References

Sysplex WLB, connections, and threads



- A thread, aka, DBAT has Db2 resources
- An in-use transport has a DBAT.
- An in-active transport has no DBAT.
- Sysplex distributor is defined in the datasource
 - used for the *initial* connection from the connection pool (JVM)
 - used for network failures (only 1 time)

MAXDBAT subsystem parameter

DSN6SYSP MAXDBAT

- *Concurrent* number of distributed threads accessing data
- Default is 200. Max is 20000 – CTHREAD
- Setting MAXDBAT to 0 blocks all inbound TCP/IP access to Db2
- Does not affect resync requests
- Limited by available ECSA
- Value of MAXDBAT affects the overall ECSA usage (4KB per thread)

CONDBAT, MAXCONQN, MAXCONQW subsystem parameters

DSN6SYSP MAXCONQN

- Connection Queue-depth
 - when MAXDBAT is reached, controls the number of inactive or new connection requests that can be queued waiting for an active DBAT
 - ON (default) – limit set to MAXDBAT value
 - OFF – limit set to CONDBAT value
 - 1-19999

DSN6SYSP CONDBAT

- *Concurrent* number of inbound DDF connections allowed
- Default is 10000. Max is 150000 (obtained only if CMTSTAT=INACTIVE)
 - TCP/IP does not use ECSA for an idle TCP connection

DSN6SYSP MAXCONQW

- Connection Queue-Max Wait
 - maximum time for a connection to wait before it is timed out
 - ON (default) – waits for the same amount of time as DSN6FAC IDTHTOIN
 - OFF – connection waits forever
 - *value* – number seconds the connection waits

IFCID 225 class 6 statistics

- allows you to identify how many threads your Db2 subsystem can support
- written in 1 minute intervals
- data section 1 – address space summary
- data section 2 – thread information
 - unable to differentiate between local thread and remote thread
- data section 3 – shared and common storage summary
- Using IFCID 225 trace data, you can calculate the maximum number of possible threads and the average thread storage footprint

Determining MAXDBAT setting

- ECSA is the constraining factor for determining MAXDBAT setting
- Do you have enough CPU?
- Are your WLM goals set properly?
 - Evaluate your WLM Performance Index (PI)
 - PI should be between 0.81 to 1.1
 - If PI indicates goals is being met or exceeded, you could increase MAXDBAT
 - If PI indicates goals is being missed, you may need to decrease MAXDBAT

$$\text{AVERAGE THREAD FOOTPRINT} = \frac{\text{QW0225_ECSA_ALLOC}}{(\text{QW0225DB} + \text{QW0225AT})}$$

$$\text{MAX NUMBER OF POSSIBLE THREADS} = \frac{(\text{QW0225EC} - (\text{QW0225_ECSA_HWM}))}{\text{AVERAGE THREAD FOOTPRINT}}$$

Learning DDF activity on your Db2 subsystem

- Collect IFCID 365 statistics trace data (by client TCP/IP address)
- Key fields:
 - QLSTNCNV / QLSTHCNV
 - QLSTNTHD / QLSTHTHD
- -DISPLAY LOCATION DETAIL report

```
-DB2ADIS LOC DET
DSNL200I -DB2A DISPLAY LOCATION REPORT FOLLOWS- 127
LOCATION                PRDID  T ATT CONNS
::FFFF:1.2.3.4         JCC04310 S    1
L209-FUNCTIONAL LEVEL=10
DISPLAY LOCATION REPORT COMPLETE
```

- Collect IFCID 411 (client application name) or 412 (client user ID)

Useful Db2 commands

-DISPLAY DDF DETAIL

- total DBATs = DSCDBAT + IUDBAT

```
-DB2ADIS DDF DET
DSNL080I -DB2A DSNLTDDF DISPLAY DDF REPORT FOLLOWS: 145
DSNL081I STATUS=STARTD
DSNL082I LOCATION      LUNAME      GENERICLU
DSNL083I DB21          USIBMSY.SYEC1DB2 -NONE
DSNL084I TCPSPORT=446  SECPOR=0    RESPOR=5001 IPNAME=-NONE
DSNL085I IPADDR=::1.2.3.4
DSNL085I IPADDR=1001:123:321:1::222
DSNL086I SQL  DOMAIN=hostname.com
DSNL090I DT=I  CONDBAT= 10000 MDBAT= 64
DSNL092I ADBAT= 1 QUEDBAT= 0 INADBAT= 0 CONQUED= 0
DSNL093I DSCDBAT= 1 INACONN= 0 IUDBAT= 1 PQDBAT= 0
DSNL105I CURRENT DDF OPTIONS ARE:
DSNL106I PKGREL = COMMIT
DSNL106I SESSIDLE = 001440
DSNL099I DSNLTDDF DISPLAY DDF REPORT COMPLETE
```

Useful Db2 commands

-DISPLAY THREAD(*) DETAIL

- client info fields in DSNV437 message
 - WORKSTATION, USERID (412), APPLICATION NAME (411)
 - SStatus
 - RA (active / idle)
 - DA (pooled)
- PH45504
- *RS* (profile suspended)
 - *RP* (HiPerf)
 - *RD* (KeepDynamic)
- PH47626
- *RH* (cursor hold, DGTT, etc.)

```
-DB2ADIS THD(*) DET
DSNV401I -DB2A DISPLAY THREAD REPORT FOLLOWS -
DSNV402I -DB2A ACTIVE THREADS - 138
NAME ST A REQ ID AUTHID PLAN ASID TOKEN
SERVER RA * 4 TestJCC USER1 DISTSERV 0038 12
V437-WORKSTATION=192.168.1.70
USERID=user1
APPLICATION NAME=TestJCC
V441-ACCOUNTING=JCC04310192.168.1.70
V442-CRTKN=::FFFF:1.2.3.4.56655.DC26F045B348
V482-WLM-INFO=DDF:1:2:*
V445-G941D46D.DD4F.DC26F045B348=12 ACCESSING DATA FOR
( 1)::FFFF:1.2.3.4
V447--INDEX SESSID A ST TIME
V448--( 1) 446:56655 W R2 2226614200408
DISPLAY ACTIVE REPORT COMPLETE
DSN9022I -DB2A DSNVDT '-DIS THD' NORMAL COMPLETION
```

Know your remote clients

- Java clients
 - db2.jcc.maxTransportObjects
 - sysplex workload balancing
 - expected num. of concurrent active connections to the Db2 data sharing group * number of members
 - default is 1000
 - property can be set at a global JVM level or at the datasource level
 - non-Java clients (db2dsdriver.cfg)
 - maxTransports
 - expected num. of concurrent active connections to the Db2 data sharing group * number of members
 - default is 1000

Controlling threads and connections

Profiles

- Provides the ability to manage application access to Db2 using a set of filtering criteria
- Profiles can
 - MONITOR (ALL) THREADS
 - MONITOR (ALL) CONNECTIONS
 - Set SPECIAL REGISTERs
 - MONITOR IDLE THREADS
- You determine the action that Db2 should take when a threshold is reached
 - WARNING
 - EXCEPTION
- Collect, analyze profile statistics with IFCID 402

Best practices

- Use sysplex workload balancing
 - enableSysplexWLB configuration set at the client
 - allows better spread of your workload across your data sharing group
- Review and analyze statistics reports (IFCID 225, 365, 411, 412, and maybe even 402)
- WLM Performance Index (SMF type 99)
 - PI between 0.81 to 1.1 (goal being met 100%)
 - PI=1 meeting goals
 - PI>1 goal is not met
 - PI<1 goal is exceeding
 - PI helps understand if goals at set to high or low
 - *You should be concerned if your goals are being met too easily or its consistently missed*

Best practices

- Know your peak periods
 - thread counts
 - thread high-water value
 - connections received
 - connection high-water value

Best practices

- Db2 AI for z/OS Distributed Connection Control (DCC)
 - Intelligently learns your thread and connection activities in your Db2 system
 - Db2ZAI automatically creates profiles for each IP address/application that it encounters
 - Helps you allocate, monitor, and adjust connections and threads for inbound TCP/IP access to your Db2 subsystems.

Q & A

Appendix A

IFCID 225 fields description

QW0225EC	Size of the extended CSA
QW0225_ECSA_ALLOC	Total extended CSA currently GETMAINed.
QW0225_ECSA_HWM	QW0225_ECSA_ALLOC high water
QW0225DB	Current number of active and disconnected (pooled) DBATs
QW0225AT	The number of active allied threads.

References

Configuration of Sysplex workload balancing and automatic client reroute for Java clients

- <https://www.ibm.com/docs/en/db2/11.5?topic=jcdcshacdzs-configuration-sysplex-workload-balancing-automatic-client-reroute-java-clients>

Configuration of Sysplex workload balancing and automatic client reroute for applications other than Java

- <https://www.ibm.com/docs/en/db2/11.5?topic=njcshacdzs-configuration-sysplex-workload-balancing-automatic-client-reroute-applications-other-than-java>

Calculating the storage requirement for the extended common service area

- <https://www.ibm.com/docs/en/db2-for-zos/13?topic=requirements-calculating-storage-requirement-extended-common-service-area>

Monitoring and controlling distributed connections

- <https://www.ibm.com/docs/en/db2-ai-for-zos/1.5.0?topic=monitoring-controlling-distributed-connections>

References

General questions for setting maxTransportObjects

- <https://www.ibm.com/support/pages/general-questions-setting-maxtransportobjects>

Monitoring storage utilization

- <https://www.ibm.com/docs/en/zos/2.5.0?topic=growth-monitoring-storage-utilization>

Using SMF record type 99

- <https://www.ibm.com/docs/en/zos/2.5.0?topic=services-using-smf-record-type-99>

Performance Index

- <https://www.ibm.com/docs/en/zos/2.5.0?topic=entries-performance-index>

Viewing performance index details

- <https://www.ibm.com/docs/en/zos/2.5.0?topic=resources-viewing-performance-index-details>

Thank you

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