Do I really need to worry about my Commit Frequency? An Introduction to Db2 Logging.

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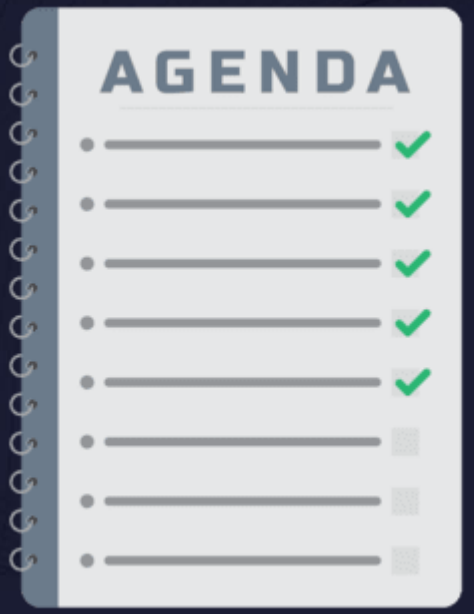
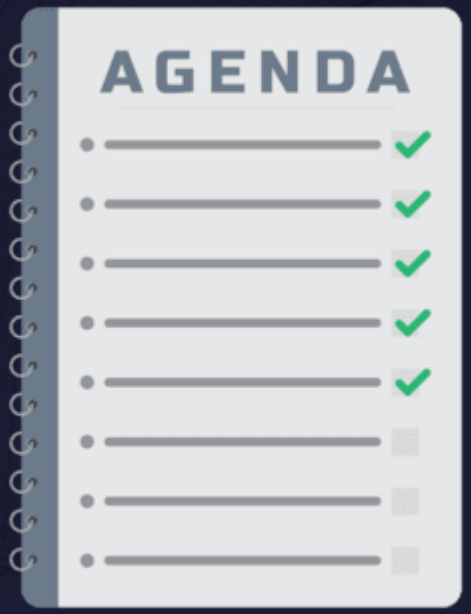
Agenda (1|2)



- What is the BSDS?
- What is the difference between Active and Archive logs?
- What is a Unit of Work?
- What is the difference between Insert, Update, and Delete log records?
- Why do I care about Data Capture Changes YES/NO?

Agenda (2|2)



- What is the importance of the Db2 Log with regards to Point In Time Recovery?
- What impact does a lot of Inserts/Updates/Deletes have on locking?
- What log activity happens when I cancel a Unit of Work?
- Questions

The BSDS

- The bootstrap data set (BSDS) contains information that is critical to Db2, such as the names of the Active and Archive logs.
- The Active and Archive log information includes the RBA/LRSN ranges covered by each dataset.
- DB2 uses the BSDS for system restarts and for any activity that requires reading the log including object recoveries.

bootstrap

[**boot**-strap]

noun

1. a loop of leather or cloth sewn at the top rear, or sometimes on each side, of a boot to facilitate pulling it on.
2. a means of advancing oneself or accomplishing something:

DSNJU004 (1|2)

```
//jobcard
//*
//STEP1    EXEC PGM=DSNJU004
//STEPLIB  DD  DISP=SHR,DSN=db2hlq.SDSNLOAD
//SYSPRINT DD  SYSOUT=*
//SYSUT1   DD  DISP=SHR,DSN=bsdshlq.BSDS01
```

DSNJU004 (2|2)

```
ACTIVE LOG COPY 1 DATA SETS
 START RBA/LRSN/TIME     END RBA/LRSN/TIME       DATE/LTIME  DATA SET INFORMATION
 ---------------------   ---------------------   ----------  --------------------
 0000000001E221599000    0000000001E23EA94FFF    2018.340    DSN=loghlq.DS02
   00DB754897FE276CD800    00DB76924A0B3A747A00    14:50       STATUS=REUSABLE
   2022.125  14:06:49.2   2022.126  14:41:51.1
 0000000001E23EA95000    0000000001E25BF90FFF    2018.340    DSN=loghlq.DS03
   00DB76924A0B3A747A00    00DB7E071973284C6000    14:50       STATUS=REUSABLE
   2022.126  14:41:51.1   2022.132  13:01:43.5
 0000000001E25BF91000    0000000001E27948CFFF    2018.340    DSN=loghlq.DS01
   00DB7E071973284C6000    ....................    14:50       STATUS=NOTREUSABLE
   2022.132  13:01:43.5    ........  .........
```

```
LALOGI          --------- Log Analyzer Log Inventory List -------- 23/06/05 14:38
COMMAND ===> _                                                  SCROLL ===> CSR

Log Type    ==> A ( A - Active, R - Archive, * - All )      Select Members ==> N
Log Copy    ==> * ( 1 - Copy 1, 2 - Copy 2 , * - All )
BSDS Name   ==> DSNDC0G.DC0G.BSDS01
------------------------------------------------------------ BADANB2
Begin Date ==>                          End Date ==> 23/06/05
Begin RBA  ==>                          End RBA  ==>
Begin LRSN ==>                          End LRSN ==>

+------------ Log Dataset Begin / Log Dataset End ---------------+
UTC Date    UTC Time  Log RBA                 Log LRSN
2023/06/04  10:07:03  00000000005501B80000    00DD65B3B57CAB782600
2023/06/05  13:43:07  00000000005513DBFFFF    00DD6725DE39B2E84600
DSN      : DSNDC0G.DC0G.LOGCOPY1.DS03
LOG TYPE: ACTIVE   LOG COPY: 1  MEMBER: DC0G
CREATED : 2022/07/18 15:02:00  STATUS: REUSABLE
------------------------------------------------------------------
2023/06/05  13:43:07  00000000005513C0000     00DD6725DE39B2E84600
2023/06/05  13:44:36  00000000005524DFFFFF    00DD672633A5712BD800
DSN      : DSNDC0G.DC0G.LOGCOPY1.DS01
LOG TYPE: ACTIVE   LOG COPY: 1  MEMBER: DC0G
CREATED : 2022/07/18 15:02:00  STATUS: REUSABLE
------------------------------------------------------------------
```

Active Logs

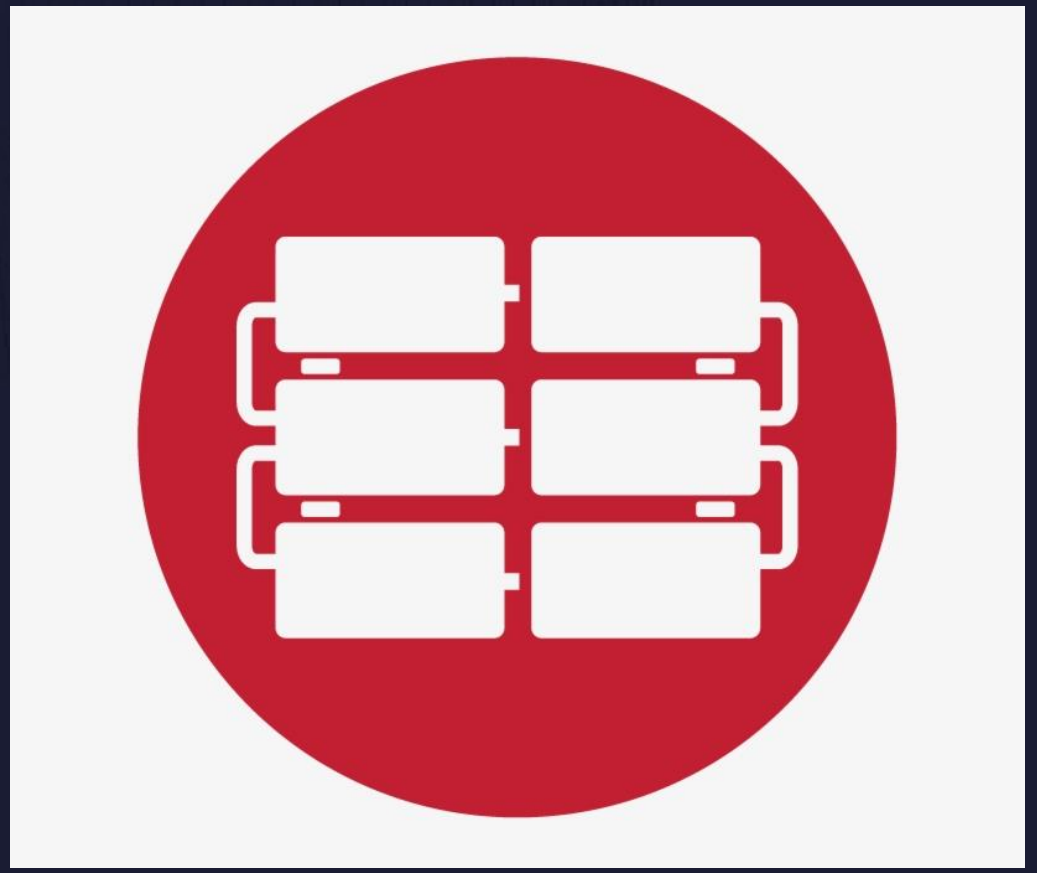
- Active Logs are where database data changes are documented
- You can have up to a maximum of 93 Active Logs
  - Prior to Db2 8 the max was 31
- When an Active log is full Db2 starts writing to the next Active Log and offloads the full Active log to an Archive log
  - Db2 cannot reuse an Active log until it is offloaded
- Active Logs are on DASD

Archive Logs

- An Archive Log dataset is created when an Active Log dataset is offloaded
- A copy of the BSDS is taken as part of the offload
- You can have a maximum of 10,000 archive logs in the BSDS
  - Prior to Db2 8 the max was 1,000
- Archive Logs are on Tape

Dual logging

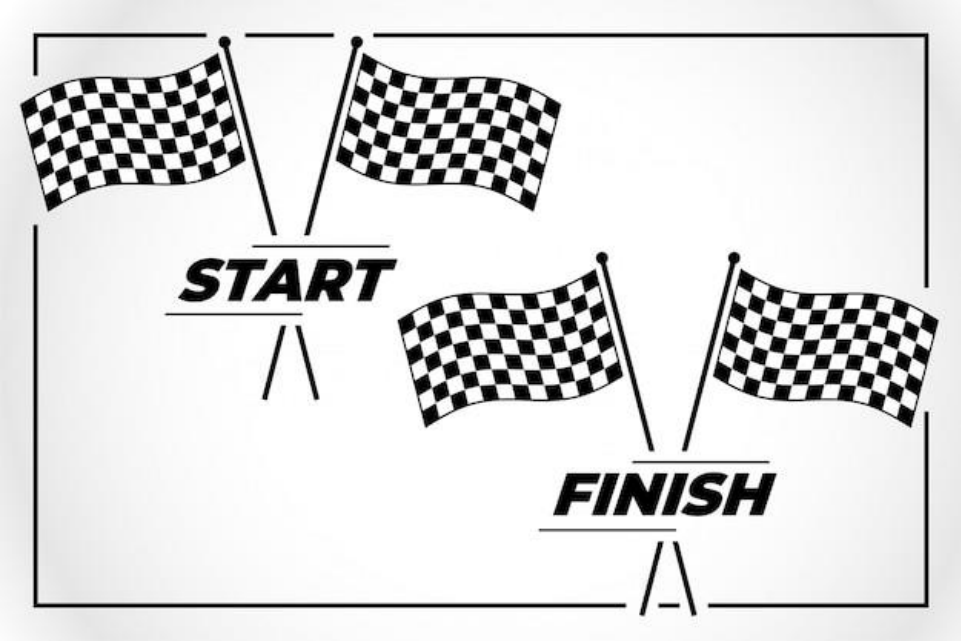
- Db2 Logging provides redundancy
- Copy 1 & 2
- Copy 1 and Copy 2 Active Logs do not need to be the same size
- You do not need the same number of Active Copy 1 and Copy 2 Logs
- You do not need the same number of max Archive Copy 1 and Copy 2 Logs



Adding and Removing Active Logs

- Adding an Active Log
  - SET LOG NEWLOG (dataset name) COPY (logcopy)
  - Db2 10
- Removing an Active Log
  - SET LOG REMOVELOG (dataset name)
  - Db2 13

Units of Work



- Begins with the first data change
- Ends with a Commit
- Until a Unit of Work is committed the data changes are not Final

Inserts, Updates, Deletes… are they logged differently?

- Deletes log what the data looked like before the change is happened
- Inserts log what the data looks like after the change is made
- Updates log both what the data looks like after the change is made as well as what the data looked like before the change happened

Logging Examples

```
Insert IDUG, BOSTON, 2022
000100C9 C4E4C740 00C2D6E2 E3D6D540 *    IDUG  BOSTON
40404000 F2F0F2F2 40               *     2022
Update BOSTON to EDINBURGH
00C5C4C9 D5C2E4D9 C7C84000 001D0000 * EDINBURGH
0100C9C4 E4C74000 C2D6E2E3 D6D54040 *   IDUG  BOSTON
404000F2 F0F2F240                  *     2022
Delete IDUG, EDINBURGH, 2022
000100C9 C4E4C740 00C5C4C9 D5C2E4D9 *    IDUG  EDINBUR
C7C84000 F2F0F2F2 40               *GH   2022
```

DSN1LOGP

```
//jobcard
…
//BSDS     DD DSN=bsdshlq.BSDS01,DISP=SHR
//SYSIN    DD *
   RBASTART  (0000000000E111F680A0)
     URID      (0000000000E111F78B80)
     URID      (0000000000E111F79EE9)
     URID      (0000000000E111F7A2AD)
   RBAEND    (0000000000E111F802D0)
   SUMMARY(NO)
/*
```

```
LALOGP          ------------------ DSN1LOGP Wizard ----------------- 23/06/06 14:46
COMMAND ===> _                                                SCROLL ===> CSR

Generate DSN1LOGP ==> N ( Y / N )

BSDS ==> D13B.BSDS01_____________________________________________  (Enter ? for a list)

LOG PROCESSING RANGE
  STARTING                              ENDING
  RBA    ==> ____________________       RBA    ==> ____________________
         Or...
  LRSN   ==> ____________________       LRSN   ==> ____________________

URID Filters ==> _  (Enter I to include URID filters)

Log Dataset Source: BSDS        Change Source ==> N          Select Members ==> N

ACTIVE/ARCHIVE LOGS  (If Log Dataset Source: LOGS specified)
O  Log Dataset Name                                    T MI Unit     Volser List
__ ____________________________________________________ _ __ ________ ______________
********************************** BOTTOM OF DATA **********************************
```

Creates, Alters, Drops, and Utilities

- Do these things get written to the Log?
  - Yes, Catalog changes are written to the Log.

DATA CAPTURE NONE|CHANGES

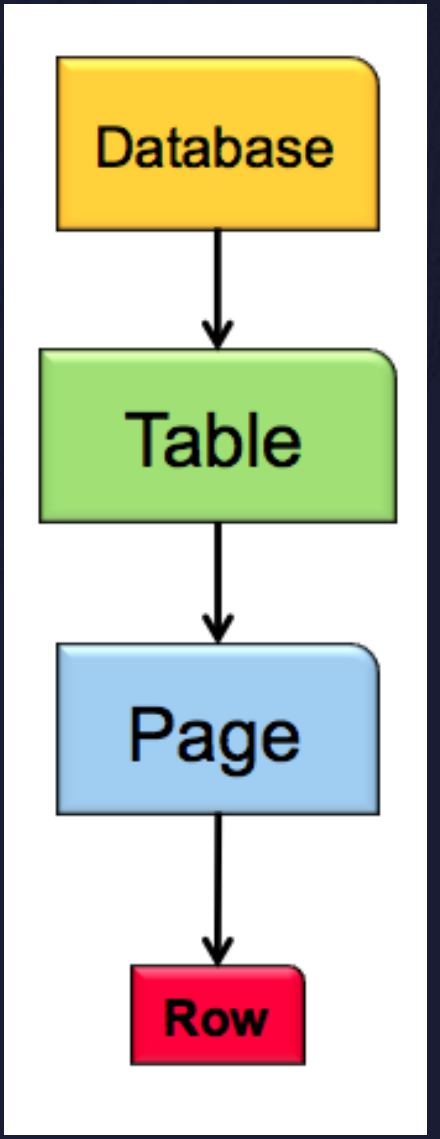
- DATA CAPTURE NONE will log only changed data
- DATA CAPTURE CHANGES will log the full row image
  - Important for Data Replication or Detailed reporting by Vendor Tools
- ALTER TABLE … DATA CAPTURE …
  - Db2 12 - Requires a quite point where no activity is happening on the table
  - Db2 13 – The magic just happens. No quite point required. No Commit required.
    - All logged changes within a UR will be consistent

Point in Time Recoveries

- You cannot recover to a Point in Time that is in the middle of a Unit of Work.

Lock Escalation

- Row Lock
- Page Lock
- Table/Tablespace Lock



What happens if I Cancel?

- CANCEL THREAD
  - All activity in the UR must be Rolled Back before the thread ends
- CANCEL THREAD NOBACKOUT
  - Objects are left in an inconsistent state and recovery steps must be taken.

Do I really need to worry about my Commit Frequency?

Thank You

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