IDUG
IDUG VIRTUAL
2021 NA Db2 Tech Conference
Db2 V11.5.6 – Recovery and Availability Update
(incl. Advanced Log Space Management)
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Agenda

- **What's New in Version 11.5.6**
- Advanced Log Space Management
  - Overview
  - Future

What's New in Version 11.5.6 (1|5)

DB24LUW-I-1038 - db2adutl performance

- **db2adult delete takes long**
  - Deletes objects one by one using TSM delete API
  - High load on TSM server interferes with new workload
- **Re-wrote to batch as many objects (the TSM server allows) into one TSM delete API call**
- **Internal tests showed 3x improvement**

What's New in Version 11.5.6 (2|5)

DB24LUW-I-941 - Tool to format log file

- **Problem:**
  - Way to tell: which tables are being changed, by what operations, the transaction id, the time of commit, and from whom. The current db2fmtlog tool does not format the log records
  - Help identify a good point-in-time to use for ROLLFORWARD in DPF
- **Goal:**
  - Provide all the internal/developer options of the db2fmtlog tool to customers such that the customer and internal versions of the tool have the same functionality
- **Highlights:**
  - Previously, a customer needed to enable the service password to access additional options, this is not needed any more
  - The customer version will not have the "-userdata" option due to data security concerns

What's New in Version 11.5.6 (3|5)

DB24LUW-I-109 - Allow usage of NX842 hardware compressed backup together with backup encryption

- Customer wants to use NX842 hardware accelerated backup compression in combination with encryption (AIX Power 7+)
- Today Db2 ships a library for compression, a library for encryption and a library for compression+encryption
- Solution is to create a new library libdb2nx842_encr.a/so that can be used like libdb2compr_encr.a/so on BACKUP command:

```
BACKUP DATABASE sample ENCRYPT ENCRLIB libdb2nx842_encr.a
```

What's New in Version 11.5.6 (4|5)

Network address translation (NAT) support for HADR Multiple Standbys

- **NAT means no direct access to particular host A, must go through another A'**
  - Usually used for firewall and security because it hides the server's real address
- **Old method: Registry variable DB2_HADR_NO_IP_CHECK**
- **New method: Configure db cfg values HADR_LOCAL_HOST / HADR_LOCAL_SVC with both the internal and external address, as " <X> | <Y>"**

What's New in Version 11.5.6 (5|5)

NAT support for HADR Multiple Standbys

- **Example: Two hosts with:**
  - Internal addresses: host1, host2 - port 55001
  - External addresses: host1E, host2E – port 55001
  - Configuration on host1:
    - HADR_LOCAL_HOST: "host1 | host1E"
    - HADR_LOCAL_SVC: "55001"
    - HADR_TARGET_LIST: "host2E:55001"
  - Configuration on host2:
    - HADR_LOCAL_HOST: "host2 | host2E"
    - HADR_LOCAL_SVC: "55001"
    - HADR_TARGET_LIST: "host1E:55001"

Agenda

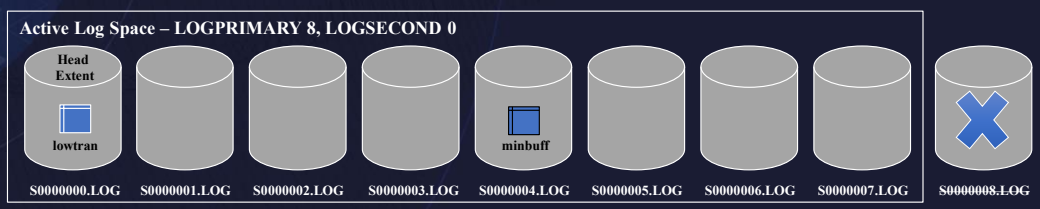
- What's New in Version 11.5.6
- **Advanced Log Space Management**
  - **Overview**
  - Future

Refresher – What is Transaction Log Full? (1|2)

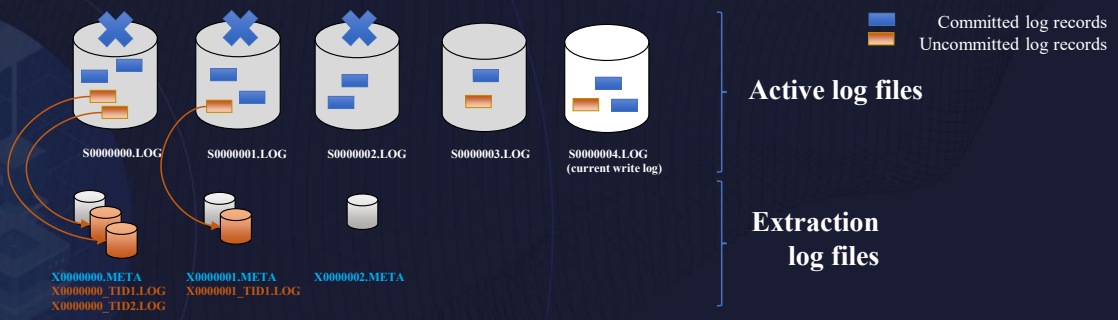
- **Maximum active log space**
  - (LOGPRIMARY + LOGSECOND) * LOGFILSIZ
- **Fixed active log space**
  - LOGPRIMARY * LOGFILSIZ
- **lowtran**
  - First (lowest) log record belonging to oldest open transaction
- **minbuff**
  - Log record of the oldest (minimum) dirty page in buffer pool

Refresher – What is Transaction Log Full? (2|2)

- **Db2 saves log files from min(lowtran, minbuff) called head extent for rollback/crash recovery**
- **Transaction log full is when Db2 needs to create a new log file above LOGPRIMARY+LOGSECOND but cannot because lowtran and/or minbuff do not move up**
  - lowtran => open transaction; minbuff => bufferpool flushing slow



Advanced Log Space Management – Solution (1|15)



- Extract (copy) log records for long running active transactions to separate extraction log files under active log path
- Allows active log files to be closed, archived, and reused, thus avoiding transaction log full

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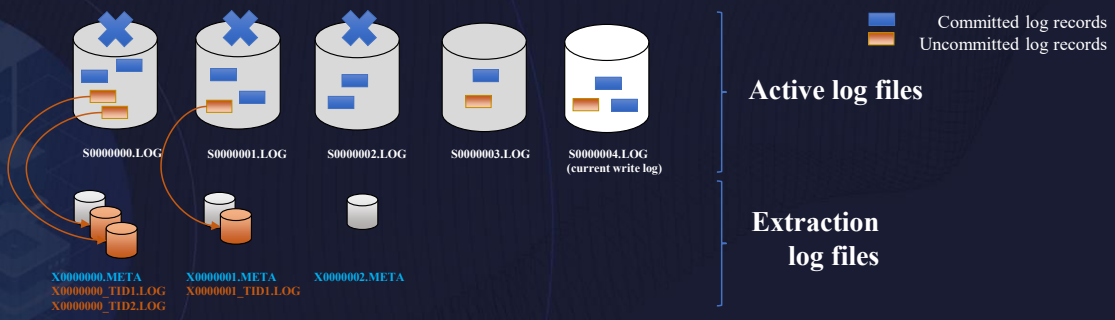
Extraction will kick in when a certain percentage of log space has been consumed and will extract log records starting from head extent ID into separate extraction log files stored in the active log path.

Advanced Log Space Management – Solution (2|15)



- **New files in active log path:**
  - **X<logFileNum>_TID<tranId>_<tranLogStreamId>.LOG** – extraction transaction ID (TID) file. Extracted log records for a specific transaction used by rollback, currently committed and recovery. 1 file per log file where log data is extracted for a transaction ID.
  - **X<logFileNum>.TMP** - meta data about extracted logs created during an in progress extraction for an active log file.
  - **X<logFileNum>.META** - meta data about extracted logs created after extraction completes for an active log file.

Advanced Log Space Management – Solution (3|15)

- **Enabled with DB2_ADVANCED_LOG_SPACE_MGMT=ON**
- **Databases must be configured with archive logging** (KEY)
- **Extraction takes place by new EDU – db2loggx running internal read log**
- **No to minimal impact to active workloads**
- **Extraction will be throttled based on policies such as:**
  - Disk available
    - Not enough disk space, extraction will idle
  - Log space consumed
    - Log space consumption high, extraction will kick in
  - Producing a benefit
    - No benefit seen, maybe due to monster transaction, extraction will idle
- **Idle extraction means possible transaction log full can occur**

Advanced Log Space Management – Solution (4|15)

- **An idle extraction scan can happen because:**
  - **Log archiving not healthy**
    - Log data from the active log files that is not archived yet is not extracted
    - Ensure log archiving is healthy and/or a FAILARCHPATH is configured
  - **Buffer pool flushing is slow**
    - Log data from the active log files that is at or above what has been flushed from the buffer pools is not extracted
    - Ensure PAGE_AGE_TRGT_MCR and PAGE_AGE_TRGT_GCR (or SOFTMAX on older database configurations) are set to appropriate values based on your workload throughput
  - **Log space consumption**
    - Consumed active log space is below the threshold (80%)
    - Avoids extracting too aggressively and wasting resources

Advanced Log Space Management – Solution (5|15)

- **An idle extraction scan can happen because:**
  - **High extraction ratio (a.k.a monster rule)**
    - Database has a relatively high uncommitted workload to committed workload ratio (30%)
    - Extracted data may be equal or greater in size than the active log files
    - High extraction I/O rate could impact workload throughput
  - **Extraction is slow**
    - It is possible that log writing is faster than log extraction or log extraction has triggered too slowly
  - **Extraction write error**
    - Including disk full

Advanced Log Space Management – Solution (6|15)

- **Rollback**
  - A line is created to determine whether read from active log files or read from extraction log files
  - Error reading extraction log files will retrieve log data from archives
  - Has shown a performance improvement for a rollback of a single transaction
- **Currently committed**
  - A line is created to determine whether read from active log files or read from extraction log files
  - Error reading extraction log files will resort to lock wait behavior
- **db2ReadLog (Replication) / Online index create (OLIC) / Table space rollforward**
  - No support for extraction log files because reader requires all log records

Advanced Log Space Management – Solution (7|15)

- **Crash recovery / Database rollforward**
  - Use extraction log files (if they exist) for redo and undo
  - Error reading extraction log files will retrieve log data from archives
  - Extraction during redo/undo phase similar to runtime
  - Extraction scan will continue where it left off, so can support indoubt transactions or any deferred undo such as from DB2_ONLINERECOVERY
- **Set write suspend / Integrated snapshot backup**
  - Extraction and set write suspend / integrated snapshot backup are serialized just like log writing
  - With INCLUDE LOGS ensuing file system copy or integrated snapshot backup will include extraction log files and can be used for future recovery through db2inidb or snapshot restore + rollforward

Advanced Log Space Management – Solution (8|15)

- **Encryption aware**
  - If database encrypted, extraction log files will be encrypted
- **Monitoring:**
  - MON_GET_TRANSACTION_LOG
  - MON_GET_UNIT_OF_WORK
  - MON_GET_UNIT_OF_WORK_DETAILS
  - db2pd –logs
- **No change to usage of MAX_LOG db cfg parm**
  - Still works on active log space as before
- **Re-visit intent of NUM_LOG_SPAN db cfg parm**
  - Does not apply to utility workloads like LOAD, so no impact
  - For non-utility workloads if set too low extraction may never kick in

Advanced Log Space Management – Solution (9|15)

- **Infinite logging supported**
- **Extraction enabled: No infinite logging vs. infinite logging**
  - No infinite logging
    - Transaction log full still possible in extreme cases
  - Infinite logging
    - Transaction log full will not happen
    - But possible workload lags in extreme cases
      - Can be avoided by setting log_disk_cap
    - Improves on the negatives of infinite logging by avoiding un-necessary retrieves

Advanced Log Space Management – Solution (10|15)

- **Databases configured with a MIRRORLOGPATH**
  - 11.5.5 introduced basic support
  - Extraction will take place as long as log data can be:
    - Read from the active log files found in either the primary or mirror log path; and
    - Extracted log data can be written to the extraction log files found under the primary log path
  - No extraction log files will be written to the mirror log path (Future support)

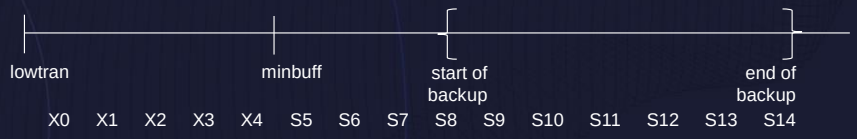
Advanced Log Space Management – Solution (11|15)

- **Traditional backup/restore**

  - Extraction log files should be considered like a database object that happens to live relative to the active log path(s)
  - User should not have to be concerned with the management of extraction log files
  - Extraction log files are there to help the ensuing rollforward not complicate it (nor the restore process)
  - **NOTE: When ALSM is configured, new backup objects in image means:**
    - 11.5.0.0: Cannot restore 11.5.6.0+ ALSM images
    - 11.5.4.0: Can restore 11.5.6.0+ ALSM images; will ignore new objects

Advanced Log Space Management – Solution (12|15)

- **Traditional backup/restore**



  - **BACKUP .. INCLUDE LOGS**
    - Will include the range of extraction and active log files that will allow you to roll forward to the end of backup:
      - Extraction log files copied at the start of the backup (X0-X4 [META and TID files])
      - Remaining active log files not extracted from yet copied at end of backup (S5-S14)
      - Any error reading (backing up) extraction log files causes us to stop including extraction log files in the image, but backup continues by including the active log files from the error file and onwards; this may involve retrieving active logs from the archives

Advanced Log Space Management – Solution (13|15)

- **Traditional backup/restore**
  - **RESTORE:**
    - If extraction log files exist in the backup image; and
    - If LFH is being restored from the image (e.g. database restore or table space restore within a database REBUILD)

      ➔ALWAYS restore extraction log files to the target active log path(s) regardless of whether LOGTARGET specified
    - In general, any error trying to restore an extraction log file is not fatal to the restore operation; a message will be written to the db2diag.log and restore will stop restoring extraction log files, but continue with the remaining data
    - Validates log paths (primary/mirror/overflow) early in restore now; trying to avoid old behavior of silently switching under the covers to default log path; similar concept as re-defining storage paths

Advanced Log Space Management – Solution (14|15)

- **HADR Support**

  - **Recommendation: User sets up a shared archive location between primary and standby**
  - Will still function without a shared archive location, but on extraction log file errors may need manual user intervention if system does not have access to active log file in the archives
  - Primary will have log extraction like a non-HADR database today
  - If during rollback an error is detected with an extraction log file, will attempt to retrieve from the archives; **NOTE: if the active file cannot be accessed, manual user intervention will be required**
  - Standby will make use of extraction log files during redo/undo like database rollforward and crash recovery today
  - Standby will have throttled extraction of inflight data ready for undo keeping a balance between physical disk space available and configured log space available

Advanced Log Space Management – Solution (15|15)

- **HADR Support**

  - If during standby redo an error is detected with an extraction log file, will contact primary to ship over active log file (similar to today when an error is seen with an active log file); may also try archives
  - If during standby undo an error is detected with an extraction log file, will attempt to retrieve from the archives; **NOTE: if the active file cannot be accessed, manual user intervention will be required**
  - **HADR_SPOOL_LIMIT (standby only)**
    - AUTOMATIC: this is implemented as (LOGPRIMARY+LOGSECOND)*LOGFILSIZ; extraction will try to play nice and take up a % of this space
    - -1 (infinite): extraction will try to play nice and take up a % of this space
    - Finite value: extraction will not take up this space
    - 0: no impact extraction will make use of space available

Advanced Log Space Management – 11.5.6.0 Restrictions

- **Future Support**
  - Databases in pureScale environments
- **No Plan to Support**
  - Databases configured with circular or log retain logging (LOGARCHMETH1/2)

Advanced Log Space Management – 11.5.6.0 Limitations

- **Disk space**
  - Will consume additional disk space to hold extraction log files
  - Should provide extra disk space otherwise extraction will not take place and log full can occur
  - Primary active log path:
    - Dedicated file system (not shared with other data)
    - Space for (LOGPRIMARY+LOGSECOND) * LOGFILSIZ
    - Additional space available for extraction log files
    - Additional space for log retrieval
      - Avoid by using OVERFLOWLOGPATH db config parm
  - Will be addressed in future (uncommitted) by log_disk_cap

Agenda

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Advanced Log Space Management – Future

- **pureScale support – Uncommitted**
  - Integration with active log file management
    - Runtime and merged log recovery operations (e.g. group crash recovery / database rollforward)
- **Full mirror logging support – Uncommitted**
  - Currently only support extraction log files in primary path
  - Full support: Extraction log files in both primary and mirror log path
  - Options?
    - Mirror extraction log files in both log paths
    - One version of extraction log files but exists in whatever path is healthy
- **On by default in future mod pack or release – Uncommitted**
  - Need to behave “well” for all workloads

log_disk_cap - Active log space disk capacity configuration parameter (1|2)

- **Allows you to specify the maximum disk capacity for storing transaction log records in the active log path:**
  - Active and extraction log files needed for inflight transactions
  - Inactive log files that have not been archived yet (and not moved to failarchpath)
  - Retrieved log files (if overflowlogpath parameter is not set)
- **logprimary / logsecond used as guidance**
- **The number of files created on disk for logging of inflight transactions might be adjusted based on other consumption**
- **logfilsz is still used to specify the size of the active log files**
- **Primary and mirror log paths should be able to hold this amount**
- **DPF/MPP and pureScale all partitions/members should be able to hold this amount**

log_disk_cap - Active log space disk capacity configuration parameter (2|2)

- **Defined in 11.5 GA but not fully supported until a later time**
- **11.5.4.0 introduces first use when configured space reached**
  - Infinite logging and database recovery undo phase
    - Wait/fail vs. allocate above configured if physical space available
- **11.5.6.0 increases usage during database recovery undo scenarios to more than just infinite logging**

Resources

- **IBM Documentation**
  - https://www.ibm.com/docs/en/db2/11.5?topic=logging-advanced-log-space-management

Questions ???

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Don’t forget to fill out a session evaluation!

Backup Slides

Advanced Log Space Management – Monitoring

New columns for MON_GET_TRANSACTION_LOG

Column Name	Data Type	Description
LOG_EXTRACTION_PROCESSED_BYTES	BIGINT	Number of bytes analyzed for extraction
LOG_EXTRACTION_PROCESSING_TIME	BIGINT	Time spent to extract log records
LOG_EXTRACTION_WRITTEN_BYTES	BIGINT	Number of bytes written to extraction log files
LOG_EXTRACTION_WRITE_TIME	BIGINT	Time spent writing to extraction log files
LOG_EXTRACTION_ROLLBACK_READS	BIGINT	Number of lookups in extraction files for rollback
LOG_EXTRACTION_ROLLBACK_TIME	BIGINT	Time spent for rollback lookups in extraction log files
LOG_EXTRACTION_CUR_COMMIT_READS	BIGINT	Number of lookups in extraction files for currently committed
LOG_EXTRACTION_CUR_COMMIT_TIME	BIGINT	Time spent for currently committed lookups in extraction log files
LOG_EXTRACTION_DISK_SPACE_USED_TOTAL	BIGINT	Number of bytes used in extraction log files
LOG_EXTRACTION_DISK_SPACE_USED_TOTAL_TOP	BIGINT	High water mark of LOG_EXTRACTION_DISK_SPACE_TOTAL_USED since database member activation
LOG_EXTRACTION_LAST_EXTRACTED_LOG	BIGINT	Log extent number of the last log file successfully extracted
LOG_EXTRACTION_PROCESSED_LSO	BIGINT	The log sequence offset of last processed log record for extraction
LOG_EXTRACTION_PROCESSED_LSN	BIGINT	The log sequence number of last processed log record for extraction
LOG_EXTRACTION_NUM_DISK_FULL	BIGINT	Number of times log extraction stopped, because there was not enough disk space in active log path

Advanced Log Space Management – Monitoring

New column for MON_GET_UNIT_OF_WORK

Column Name	Data Type	Description
LOG_EXTRACTION_DISK_SPACE_USED	BIGINT	Number of bytes used in extraction log files

New XML element for MON_GET_UNIT_OF_WORK_DETAILS

Column Name	Data Type	Description
LOG_EXTRACTION_DISK_SPACE_USED	xs:nonNegativeInteger	Number of bytes used in extraction log files

Advanced Log Space Management – Monitoring

```
Logs:
Current Log Number              54
Pages Written                   15
Cur Commit Disk Log Reads       0
Cur Commit Total Log Reads      0
Method 1 Archive Status         Success
Method 1 Next Log to Archive    54
Method 1 First Failure          n/a
Method 2 Archive Status         n/a
Method 2 Next Log to Archive    n/a
Method 2 First Failure          n/a
Extraction Status               Active
Current Log to Extract          46
Log Chain ID                    0
Current LSO                     65116033
Current LSN                     0x00000000000565F1

Address            StartLSN          StartLSO          State      Size       Pages      Filename
0x00007F4F045C8C78 0000000000054EBD  64531233          0x00000000 16         16         S0000046.LOG
…  <truncated> …
```

db2pd –db sample -logs

New rows:

Extraction Status - The current status of extraction. Values can be "n/a", "Active", "Error" or "Recovery".

Current Log to Extract - The current log to extract. This is the active log file that extraction is extracting from or needs to extract from.

Advanced Log Space Management – Monitoring
Would feature be beneficial? (1|2)

- **Three considerations of what "beneficial" means:**
  - Avoid transaction log full
  - Disk space consumption
  - CPU and I/O overhead (e.g. impact to system/workload)
- **Ideally, the best of all**
  - Avoid transaction log full by extracting very little
  - Extraction process shown to be little overhead

Advanced Log Space Management – Monitoring
Would feature be beneficial? (2|2)

- **Monitor the longest running transactions on the database**
- **(A) Get total amount of log space used by the 5 longest running transactions:**

```
SELECT SUM(uow_log_space_used)
FROM (SELECT uow_log_space_used,
             uow_start_time
      FROM TABLE(MON_GET_UNIT_OF_WORK(NULL,-1)) AS t
      ORDER BY uow_start_time ASC FETCH FIRST 5 ROWS ONLY)
```

- **(B) Get total active log space used by the database:**

```
SELECT total_log_used
FROM TABLE(MON_GET_TRANSACTION_LOG (-1)) AS t
```

- **If ratio of A / B is low then extraction will be beneficial**
  - Indicates long running low logging volume

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> "If ratio of A / B is low then extraction will be beneficial"

"low" here is relative. The lower the number the better the disk space saving. So need to decide what amount of disk space you are willing to save in order to avoid transaction log full.

Advanced Log Space Management – Monitoring
How much disk space do I need to run optimally with feature?

- **Depends on amount of data that can be extracted**
  - If very little to extract then potentially can reduce active log space
- **Bare minimum is enough disk space to extract from one active log file**
  - Non-infinite: (LOGPRIMARY + LOGSECOND + 1) * LOGFILSIZ
  - Infinite: (LOGPRIMARY + 1) * LOGFILSIZ
- **Recommend ~20% extra disk space**
- **Continue to monitor until you find right fit**

Advanced Log Space Management – Monitoring
Is feature enabled?

Turn on registry variable:

db2set DB2_ADVANCED_LOG_SPACE_MGMT=ON

- Not enabled:
  - db2diag.log will state reason

```
db2pd -db sample -logs

Extraction Status             n/a
Current Log to Extract        n/a
```

Enabled:

```
db2pd -db sample -logs

Extraction Status             Active
Current Log to Extract        0

db2pd -edus |grep loggx
901       140049278560000      7921                db2loggx (SAMPLE)


EDUID    : 901                 EDUNAME: db2loggx (SAMPLE)
FUNCTION: DB2 UDB, data protection services,
sqlpLogExtractionScanCB::loggxEnableExtractionScan, probe:1410
DATA #1 : <preformatted>
Log extraction under advanced log space management has been enabled for
database.
 Primary extraction path = /db2/NODE0000/SQL00001/LOGSTREAM0000/
  Mirror extraction path = Not set
```

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Turn on the registry variable DB2_ADVANCED_LOG_SPACE_MGMT and activate database. The db2diag.log will display a message whether log extraction is enabled or not. db2pd –logs will also show state of extraction. All extraction is done by the new db2loggx EDU.

Advanced Log Space Management – Monitoring
How efficient is extraction?

- **This can be based on the extraction filter rate**
  - Data analyzed vs. data written

```
SELECT log_extraction_written_bytes,
       log_extraction_processed_bytes
FROM TABLE(MON_GET_TRANSACTION_LOG(-1)) as t

    LOG_EXTRACTION_WRITTEN_BYTES LOG_EXTRACTION_PROCESSED_BYTES
    ---------------------------- ------------------------------
                           16589                         647632
```

- **16,589 / 647,632 = ~3% of active log data written has been extracted = efficient**

Advanced Log Space Management – Monitoring
Is feature healthy and working? (1|3)

- **What constitutes extraction health:**
  - No transaction log full ☺
  - Right workload / configuration (extraction filter rate)
    - Using the extraction filter rate can tell if extracting too much
      - Main cause of slow extraction speed
  - Archiving
    - Monitor to ensure not falling behind or sick
    - Use FAILARCHPATH
  - Bufferpool flushing (minbuff)
    - Verify PAGE_AGE_TRGT_MCR / PAGE_AGE_TRGT_GCR (or SOFTMAX)
  - Disk full
    - Verify storage space assigned to active log paths

Advanced Log Space Management – Monitoring
Is feature healthy and working? (2|3)

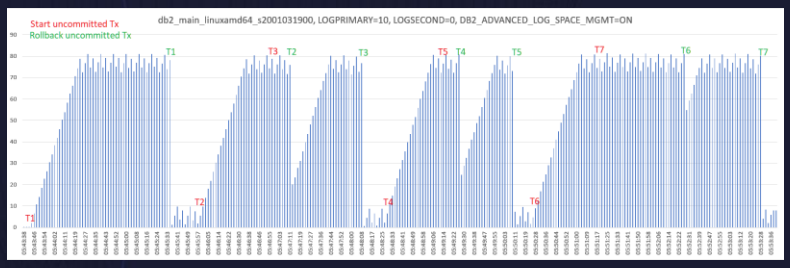
- **Helpful queries/commands:**

```
SELECT first_active_log,
       log_extraction_last_extracted_log AS last_extracted_log,
       log_extraction_num_disk_full AS num_extract_disk_full,
       case archive_method1_status
          when 1 then 'Good' else 'Failure' end as archive_method1_status,
       method1_next_log_to_archive,
       current_active_log,
       last_active_log
FROM TABLE(MON_GET_TRANSACTION_LOG(-1)) as t

FIRST_ACTIVE_LOG     LAST_EXTRACTED_LOG   NUM_EXTRACT_DISK_FULL ARCHIVE_METHOD1_STATUS
-------------------- -------------------- --------------------- ----------------------
                 989                 1032                     0 Good

METHOD1_NEXT_LOG_TO_ARCHIVE CURRENT_ACTIVE_LOG   LAST_ACTIVE_LOG
--------------------------- -------------------- --------------------
                       1034                 1034                 1035
```

Advanced Log Space Management – Monitoring
Is feature healthy and working? (3|3)

- **db2pd -db sample -logs**

```
Logs:
Current Log Number              1034
…
Method 1 Archive Status         Success
Method 1 Next Log to Archive    1034
…
Extraction Status               Active
Current Log to Extract          1033
…
```




```
StartLSN          StartLSO             State       Size       Pages      Filename
00000000000729AB 78259201              0x00000000 4          4          S0001026.LOG
…
0000000000000000 78405937              0x00000000 4          4          S0001035.LOG
```

47

No log data will be extracted from an active log file that has not been archived yet. This would duplicate disk space. Ensure methx_status is 1 (healthy), not 0 (error).

No log data will be extracted from an active log file where minbufflsn exists. This is due to recovery algorithm that needs to replay all log records >= minbufflsn. So no benefit of extracting such data as it would duplicate disk space.

Advanced Log Space Management – Monitoring
What is the disk space consumption of extraction?

- **Current total extraction disk space consumed**
- **Maximum total extraction disk space consumed since last activation**

```
SELECT log_extraction_processed_bytes AS processed_bytes,
       log_extraction_written_bytes AS written_bytes,
       log_extraction_disk_space_used_total AS disk_space_used_total,
       log_extraction_disk_space_used_total_top AS disk_space_used_total_top
FROM TABLE(MON_GET_TRANSACTION_LOG(-1)) as t

 PROCESSED_BYTES WRITTEN_BYTES DISK_SPACE_USED_TOTAL DISK_SPACE_USED_TOTAL_TOP
 --------------- ------------- -------------------- ------------------------
          266882           165                35165                    54461
```

48

This query tells you that since the last activation extraction processed 266,882 bytes of log data from the active log files. From that amount, 165 bytes of log data was written to extraction TID files. The current total amount of disk space consumed by extraction files, including log data and meta data, is 35,165 bytes. Since the last activation, extraction has taken up 54,461 bytes.

Advanced Log Space Management – Monitoring
What transaction consumes the most extraction disk space?

```
SELECT application_handle,
       substr(char(APPLICATION_NAME), 1, 16) AS app_name,
       uow_log_space_used AS active_disk_space_used,
       log_extraction_disk_space_used AS extract_disk_space_used
FROM TABLE(MON_GET_UNIT_OF_WORK(NULL,-1)) AS t
ORDER BY extract_disk_space_used DESC fetch first 1 rows only

APPLICATION_HANDLE   APP_NAME         ACTIVE_DISK_SPACE_USED EXTRACT_DISK_SPACE_USED
-------------------- ---------------- ---------------------- ----------------------
                   9 db2bp                               841                    293
```

- **db2pd -db sample -applications**

```
AppHandl … Appid
9        … *LOCAL.user.190926023238
```

- **db2pd -db sample -transactions**

```
AppHandl … TID
9        … 0x00000000115A
```

NOTE: Same TID that matches directory listing in log directory

```
> ls -l
293 X0000868_TID000000000000115A_0000.LOG
```

49

To find the transaction that is consuming the most extraction log space allows one to understand if this is a known expectation or not, maybe possibly a rogue transaction.

You can map a transaction ID (TID) from a directory listing or you can use a combination of commands to track down which application/transaction is consuming the most amount of extraction space.

The above example shows that this particular transaction has written 841 bytes of log data to the active files, but only 293 bytes have been extracted so far.