z/TPFDF Update

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z/TPFDF Delivered Enhancements

Optimized B+Tree Add Operations

A z/TPF programmer can efficiently add LRECs to a B+TREE data file without knowing the current position in the data file.

Previously: Programmers had to know the current LREC position and decide how to efficiently add an LREC

a. DBADD without USEBTREE: Check current block and then sequentially search data blocks for add location

b. DBADD with USEBTREE: Ignore current block and use B+TREE to find add location

Now: Programmers can skip the USEBTREE option and always add LRECs efficiently using the B+TREE

a. DBADD without USEBTREE: Check current block and then use B+TREE to find add location

b. DBADD with USEBTREE: Ignore current block and use B+TREE to find add location

APAR PI76015

Encryption and Cache Updates

A database administrator can make room for new files in the z/TPFDF control global by removing unused entries and without resizing the global.

- Encryption and cache controls for z/TPFDF files are stored in the IDFCNTRL format-2 global
- z/TPFDF files are added to the control global by the ZUDFM ENCRYPT / CACHE commands
- Use new REMOVE parameter on the ZUDFM ENCRYPT / CACHE commands to remove a z/TPFDF file from the control global
  - File is removed only if encryption and cache are disabled for the file

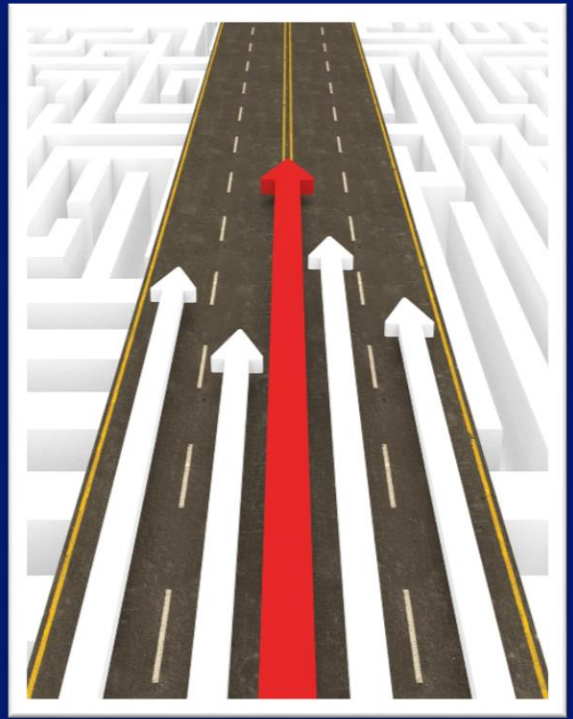
APAR PI85156

Support for FARF6 Fixed Records

A Database administrator can allocate large z/TPFDF fixed record databases and create extremely wide indexes without impacting 4-byte file addressing.

Previously: Fixed records could be allocated using only 4-byte file addresses (FARF 3/4/5)

- Limited to 4 billion addresses shared across fixed and pools
- Size of z/TPFDF indexes and hashes may be limited based on availability of file addresses



Now: Define z/TPFDF files using FARF6 fixed records

- Allocate a single fixed record with up to 4 BILLION ordinals
- Minimize overflow records across a large hash space
- Does not impact to availability of 4-byte file addresses
- Use FARF6 fixed records in new databases only

APARs PJ44596 & PI76032

CRUISE Enhancements

A database administrator can restore fixed record databases faster and with fewer z/TPF system resources.

- **Previously:** CRUISE REBUILD restores all records to pools and then copies primes to fixed records
  - Consistent database view during restore
  - Extra copy step increases restore time
  - Impractical on systems with few available pools

- **Now:** Use CRUISE REBUILD with FIXDIRECT option to restore primes directly to fixed records
  - Avoids extra I/O – Restore databases faster
  - Avoids extra pool use – Restore databases to systems with limited pools
  - Intended for test systems - Database is not consistent during restore

APAR PI83551

For updates on Data Events for z/TPFDF, see “Business Events Update”

z/TPFDF Future Enhancements

Disclaimer

Any reference to future plans are for planning purposes only. IBM reserves the right to change those plans at its discretion. Any reliance on such a disclosure is solely at your own risk. IBM makes no commitment to provide additional information in the future.

Recoup and CRUISE Statistics: As-Is

- A database administrator can use the ZRECP STA and ZFCRU DISPLAY-STATISTIC commands to display database statistics for a z/TPFDF database.
- Use statistics to understand database size, current state, migration progress, etc.
  - Statistics include block counts, chain lengths, LREC & LLR counts, encryption status, etc.
- Statistics for a single database are limited to a maximum number of referenced file IDs
  - A database is a top-level file ID and file IDs referenced through that top level ID
  - Statistics for referenced file IDs past the limit are not collected
    - For example, recoup would only collect statistics for 16 of 30 referenced file IDs
  - May not have complete view of a database

- Recoup limited to 17 IDs
  (1 top-level ID + 16 referenced IDs)
- CRUISE limited to 22 IDs
  (1 top-level ID + 21 referenced IDs)

Recoup and CRUISE Statistics: To-Be

A database administrator can use the ZRECP STA and ZFCRU DISPLAY-STATISTIC commands to display the complete set of statistics for a z/TPFDF database.

- Provide a full view of the database by increasing the maximum number of referenced file IDs for recoup and CRUISE statistics
- Use the same limit for both recoup and CRUISE

- How many referenced file IDs do you have in a database?
- Does the number of referenced file IDs tend to grow? How quickly?

Variable Length Algorithms: As-Is

- Algorithms are used with indexes to find subfiles using data other than the prime file address
  - For example: Find a customer subfile using the customer ID, phone number, email, etc.

- Algorithms are defined with a fixed length in the DBDEF
  - Variable length data (names, emails, etc.) is padded or truncated to fit the fixed length
  - Index LRECs contain the fixed length algorithm

- Algorithms with a large difference between average length and the fixed length
  - Wasted space in many LRECs
  - More overflow records than desired
  - For example: Index using email addresses
    - Fixed length of 250 characters, but may only average 20 characters

Example Index Record

z/TPFDF Header
Index LREC 1: jane.doe@aol.com **Padding - Wasted Space**
Index LREC 2: john.smith@gmail.com **Padding - Wasted Space**
Index LREC 3: jonathan.edward.winters @My.Really.Big.Important .Company.com
z/TPFDF Trailer

Variable Length Algorithms: To-Be

A database administrator can use variable length algorithms and support large algorithm lengths while efficiently using storage and minimizing overflows.

- Algorithms are defined as variable length in the DBDEF
  - Variable length algorithms consist of a length followed by data
  - No padding required

- Size of index LREC uses the actual algorithm length
  - No “wasted space” in index LRECs
    - Each LREC is sized appropriately
  - Store more LRECs per index record
  - Minimize overflow records
    - Fewer overflow records reduces I/O and CPU overhead

Example Index Record

Variable Length Algorithms: Our Current Thoughts

- Format of variable length algorithm is length field followed by data
  - Length field: 2 bytes
  - Maximum data length: 253 bytes
  - Maximum algorithm size (length + data) is 255 bytes
- Applications use new algorithm string format to access subfiles
  - Only affects files defined with new variable length algorithms
- Do you need to set a lower limit for the maximum algorithm length?
  - For example: Limit the maximum length to 100 bytes?
- Is there a use case for variable length algorithms in multi-level indexes?

Algorithm String: Fixed Length Algorithms

Index data	Algorithm data	Algorithm Padding
john.smi	john.smith@gmail.com	**********

Algorithm String: Variable Length Algorithms

Index data	Alg Len	Algorithm data
john.smi	20	john.smith@gmail.com

Calling all Sponsor Users!

Help us make sure our enhancements solve your needs!

Contact us if you are interested in either of the following z/TPFDF enhancements….

- Recoup and CRUISE statistics
- Variable Length Algorithms

Thank You!

Trademarks

Notes

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