< Insert Operation Flow Chart >
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db_delete()
- find key record
- find key leaf
- key exists
  - false → return
  - true → delete_entry()

delete_entry()
- remove entry from node
- node is root
  - true → adjust_root()
  - false → num keys ≥ minimum
    - true → return
    - false → get neighbor index
      - sum of num key < capacity
        - true → coalesce_nodes()
        - false → redistribute_nodes()

adjust_root()
- root has keys
  - true → return
  - false → root has a child
    - true → make child new root → return
    - false → destroy tree → return

coalesce_nodes()
- neighbor is left of node
  - false → swap node and neighbor
  - true → get neighbor (left) insertion index
- node is not leaf
  - true → append k_prime → update number of keys → append keys and children into neighbor → update parent of appended children
  - false → append node keys and records → update number of keys → update neighbor right sibling pointer

redistribute_nodes()
- neighbor is left of node
  - true / false → node is not leaf
    - true → insert k_prime and last/first child of neighbor into node front/back → update parent of inserted child → update key of parent k_prime index
    - false → insert last/first record of neighbor into node front/back → update right sibling pointers → update key of parent k_prime index
  - update number of keys → return

< Delete Operation Flow Chart >
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api.h

- init_db / shutdown_db
- Index Manager APIs

Tests

- api_test
- file_test
- page_test
- test_util

log_util.h

- Print Functions for Debugging

bpt.h

- Page Loader/Saver, Checker, Updater
- Find
- Insertion
- Deletion

file_util.h

- TableManager
- FileUtil

file.h

- Disk Space Manager APIs

page.h

- Constants, Type definitions
- page_t
- HeaderPage (header, free)
- NodePage (leaf, internal)
  - page_header_t
  - Record
  - Edge

⟨ Project Structure ⟩
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api.h

init_db / shutdown_db	Index Manager APIs

Tests

api_test	file_test	page_test

test_util

log_util.h | bpt.h

Print Functions for Debugging	Page Loader/Saver, Checker, Updater	Find	Insertion	Deletion

buffer.h

Buffer Storage	Buffer Manager APIs

Buffer Structure	Index Allocator	Page Index Mapper	Buffer Controller

file_util.h | file.h

TableManager	FileUtil	Disk Space Manager APIs

page.h

Constants, Type definitions	page_t	HeaderPage (header, free)	NodePage (leaf, internal)

			page_header_t	Record	Edge

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< Layered Buffer Structure >
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Meta Fields

int **num_buf**

int **num_used**

int **oldest**[3]

int **latest**[3]

std::map⟨std::pair⟨int64_t, pagenum_t⟩, int⟩
index map

std::vector⟨buffer_t⟩
pool

std::vector⟨page_t⟩
frames

std::vector⟨std::pair⟨int, int⟩⟩
LRU

std::vector⟨std::pair⟨int, int⟩⟩
Eviction Priority

Reserved
&
Aligned
Spaces

struct buffer_t

int **frame_id**

int64_t **table_id**

pagenum_t **pg_num**

bool **is_dirty**

int **pin_count**

Separate Fields

page_t **frame**

int **LRU prev**

int **LRU next**

int **Eviction Priority prev**

int **Eviction Priority next**

< Buffer Storage Definition >
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< LRU Implementation >
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