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11-7

11-17

With structure 0.a:

a. Find records with a value of 11

i. Search the first level index; follow the first pointer.

ii. Search next level; follow the third pointer.

iii. Search leaf node; follow first pointer to records with key value 11.

b. Find records with value between 7 and 17 (inclusive)

i. Search top index; follow first pointer.

ii. Search next level; follow second pointer.

iii. Search third level; follow second pointer to records with key value 7, and after accessing them, return to leaf node.

iv. Follow fourth pointer to next leaf block in the chain.

v. Follow first pointer to records with key value 11, then return.

vi. Follow second pointer to records with with key value 17.

With structure 0.b:

a. Find records with a value of 11

i. Search top level; follow second pointer.

ii. Search next level; follow second pointer to records with key value 11.

b. Find records with value between 7 and 17 (inclusive)

i. Search top level; follow second pointer.

ii. Search next level; follow first pointer to records with key value 7, then return.

iii. Follow second pointer to records with key value 11, then return.

iv. Follow third pointer to records with key value 17.

With structure 0.c:

a. Find records with a value of 11

i. Search top level; follow second pointer.

ii. Search next level; follow first pointer to records with key value 11.

b. Find records with value between 7 and 17 (inclusive)

i. Search top level; follow first pointer.

ii. Search next level; follow fourth pointer to records with key value 7, then return.

iii. Follow eighth pointer to next leaf block in chain.

iv. Follow first pointer to records with key value 11, then return. v. Follow second pointer to records with key value 17.

11-21

Hashing distributes search key values uniformly and randomly across the set of buckets available. Because key values do not occupy consecutive buckets, searching for all values within a range may well require reading every bucket -- far more inefficient than a B+-tree or even a sorted file without index.