DSCI 551 HW4

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1.

(a)

① read the root node, find the 1st internal node.

② read the 1st internal node, find the 5th leaf node.

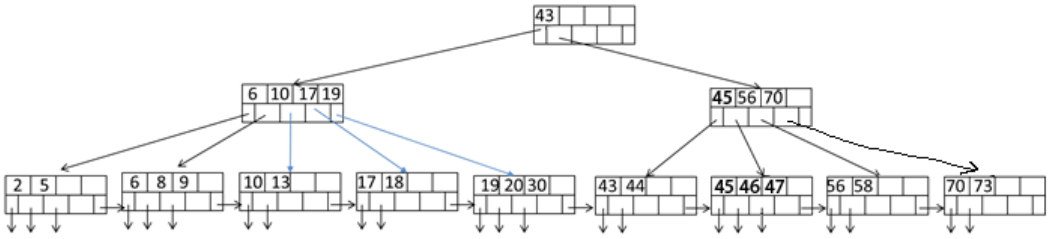
③ read the 5th leaf node, find the start point 20.

④ sequential traversals of leaves until 50, so we read 6th and 7th leaf node.

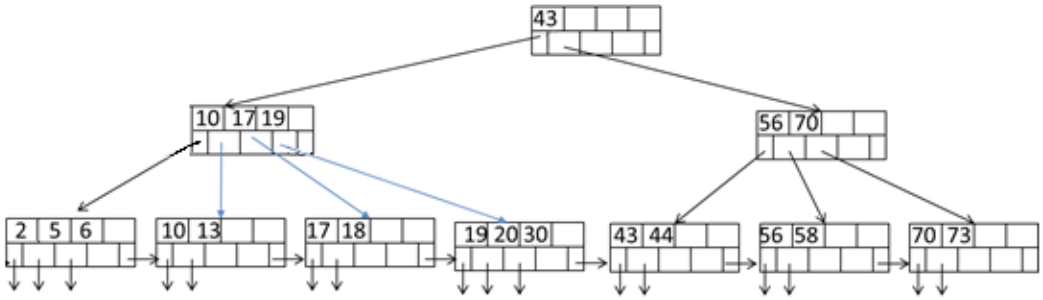
⑤ The end point 50 is less than the first data in 7th leaf node, so we stop.

Totally, we did 5 reads and 0 writes, which means 5 block I/O's.

(b)



(c)



2.

(a)

R ⋈ S

for each 100 blocks b_r of R do

  for each block b_s of S do

    for each tuple r in b_r do

      for each tuple s in b_s do

        if r and s join then output (r, s)

Total Cost: B(R) + B(R)B(S)/100 = 505,000 Block I/O's.

(b)

$R \bowtie S$

for each 100 blocks b_s of S do

  for each block b_r of R do

    for each tuple s in b_s do

      for each tuple r in b_r do

        if r and s join then output (r, s)

Total Cost: B(S) + B(S)B(R)/100 = 510,000 Block I/O's.

(c)

For $B(R)+B(S) > M^2$

Sort R: in two passes 4B(R) = 20,000

Sort S: in two passes 4B(S) = 40,000

merge: B(R)+ B(S)=15,000

So total cost: 5B(R) + 5B(S) = 75,000 Block I/O's

(d)

For $\text{Min}(B(R), B(S)) < M^2$

So total cost: 3B(R) + 3B(S) = 45,000 Block I/O's.