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For Random Organized File (Bucket):

Given:
- NR = num of records
- R = size record
- CB = size block
- P = pointer size
- NB = number buckets

- To find BD, blocks for bucket directory

$$PB = \left\lfloor \frac{CB}{P} \right\rfloor = \text{how many pointers in 1 block}$$

$$BD = \left\lceil \frac{NB}{PB} \right\rceil = \text{how many blocks for a bucket directory}$$

- To find blocks for main file:

M = max num of a record inside a block

$M \cdot R + P \leq CB$ so $M \leq \left\lfloor \frac{CB-P}{R} \right\rfloor$

(!) $M = \left\lfloor \frac{CB-2P}{R} \right\rfloor$ if there are 2 pointers (start - end)

$$RB = \left\lceil \frac{NR}{NB} \right\rceil = \text{how many rec inside a bucket}$$

$$NBB = \left\lceil \frac{RB}{M} \right\rceil = \text{how many blocks inside a bucket}$$

- Total of blocks: $NBB \cdot NB + BD = \text{tot block}$

  (blocks inside each bucket × num. of buckets)

- Avg linear search: $\left\lceil \frac{NBB}{2} \right\rceil = MA$

- How many buckets if MA = x? $NB = \left\lceil \frac{NR}{2 \cdot x \cdot M} \right\rceil$

(!) check always this is an INT

ISAM:

Given:
- NR = num of recs
- R = rec size
- K = key size
- P = pointer size
- CB = block size

- How to find number of blocks for main file BF

$$M = \left\lfloor \frac{CB \cdot U - P}{R} \right\rfloor \quad (\odot) \qquad BF = \left\lceil \frac{NR}{M} \right\rceil$$

U = utilization rate

» WATCH if the exercise says the block points to each other

⊙ check if records are pointed

- How to find blocks for index BI

$$RI = K + P \qquad M_{RI} = \left\lfloor \frac{CB}{RI} \right\rfloor \qquad BI = \left\lceil \frac{BF}{M_{RI}} \right\rceil$$

- Binary search: $MA = \lceil \log_2 BI \rceil + 1$

B-Tree:

- NR = num records
- R = record size
- K = key size
- CB = block size
- P = pointer

- How to find number of blocks for index and main file:

① check $M \cdot R \geq CB$

$$M = \left\lfloor \frac{CB}{R} \right\rfloor \qquad M = \left\lfloor \frac{CB/2}{R} \right\rfloor$$ if ex. says tree min

If B+ tree $\longrightarrow M = \left\lfloor \frac{CB - P}{R} \right\rfloor$

$$BF = \left\lceil \frac{NR}{M} \right\rceil \qquad BI = \left\lfloor \frac{CB - P}{K_1} \right\rfloor + 1$$

if B+ tree $BI = \left\lfloor \frac{CB - P}{K_1} \right\rfloor + 1$

if min check of $M_{A_1} \cdot R \geq \frac{CB}{2}$

$$L_1 = \left\lceil \frac{BF}{BI} \right\rceil$$

$$L_n = \left\lceil \frac{L_{n-1}}{BI} \right\rceil \quad \text{until } L_k = 1$$

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