

COMP 421 Database System

- Assignment 3 -

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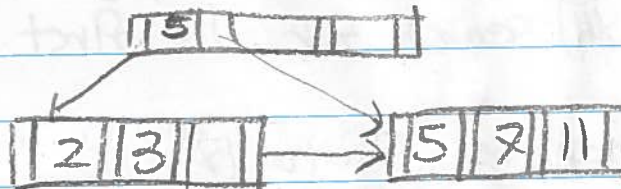
Exercise 1

a) (2, 3, 5, 7, 11, 17, 19, 23, 29, 31)

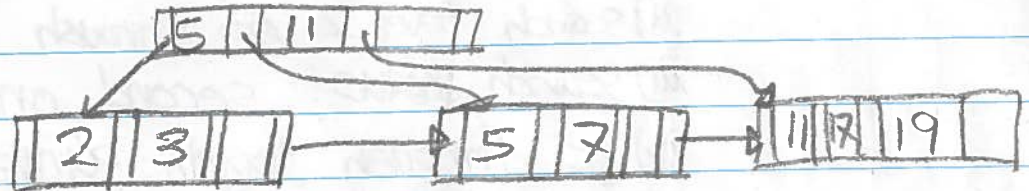
4 pointers \Rightarrow 3 nodes



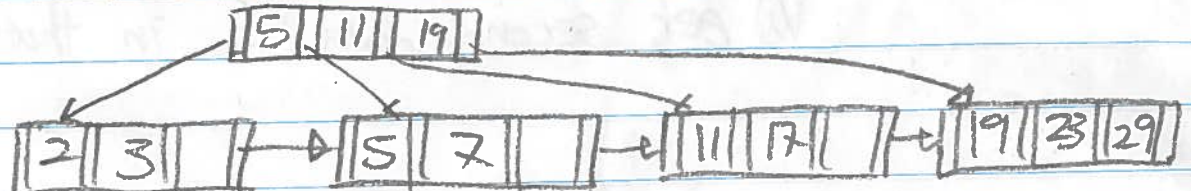
inserting 7 \Rightarrow split



inserting 17 \Rightarrow split



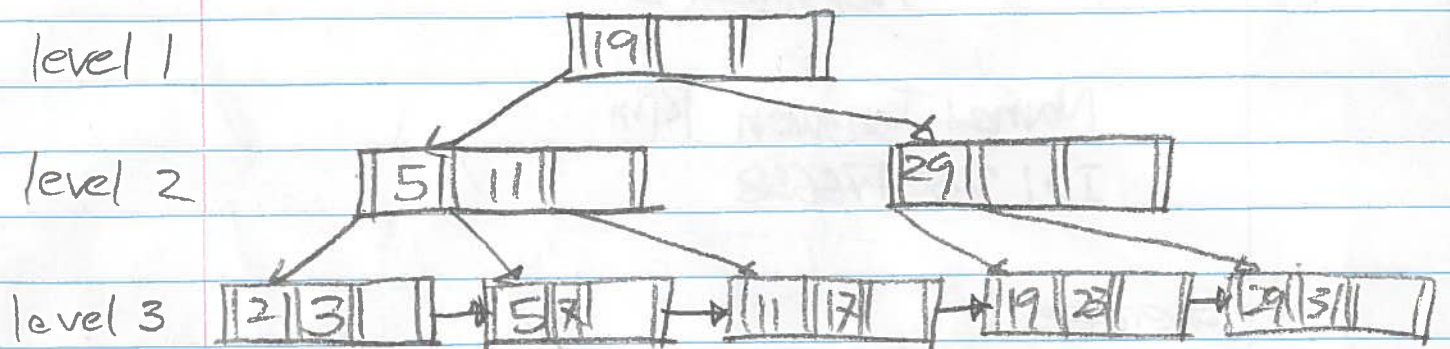
inserting 23 \Rightarrow split



inserting 31 \Rightarrow split

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Signal form is;



b) Searching 11

- Search level 1. go through first pointer
- Search level 2. go through third pointer
- Search for 11. first one is 11

c) Searching 7 to 17

- Search level 1. go through first pointer
- Search level 2 go through second pointer
- Search value. second one is 7.
- go through fourth pointer. for next
- get first data (11) in that block
- get second data (17) in that block.

Exercise 2

STEP 1

$P(T, \text{branch})$

$P(S, \text{branch})$

STEP 2

$\Pi_{\text{branchname}}((\Pi_{\text{branchname}, \text{asset}} T) \bowtie_{T.\text{asset} > S.\text{asset}} (\Pi_{\text{asset}} (\sigma_{S.\text{branch} = 'Brooklyn'} S)))$

Reasons

- ① We don't save unloaded attributes
- ② We restrict right side of joinning. ^{be}
s.t less amount of data would be joined and copied.

Exercise 3

$$a) R1: \frac{20\,000 \text{ tuples}}{25 \text{ tuples/block}} = 800 \text{ blocks}$$

$$R2: \frac{45\,000 \text{ tuples}}{30 \text{ tuples/block}} = 1500 \text{ blocks}$$

using simple iteration, we need

$$20\,000 \times 1500 + 800 \text{ disk accesses} \\ = 300\,00800 \text{ disk accesses}$$

$$b) \text{ cost} = \frac{b_r}{(M-2)} \cdot bs + b_r$$

$$= \frac{1500}{M-2} \cdot 800 + 1500$$

M = Memory size

Best case $M=1500$

$$\Rightarrow \text{cost} = 800 + 1500$$

$$= 2300 \text{ disk accesses}$$

Worst case $M=3$

$$= 1500 \cdot 800 + 1500$$

$$= 1201500$$