Homework 2

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17.18

a)

$block pointer(6) + record pointer(7) + (Name(30 bytes) + Ssn(9 bytes) + Department\_code(9 bytes) + Address(40 bytes) + Phone(10 bytes) + Birth_date(8 bytes) + Sex(1 byte) + Job\_code(4 bytes))$

$6 + 7 + (30 + 9 + 9 + 40 + 10 + 8 + 1 + 4) = 124$ Bytes

b)

$bfr = \frac{512}{124} = 4.12$ 4 records per block
$\frac{30000 records}{4 records per block} = 7500$ blocks

g)

i

$(p * P) + ((p1) * Ssn) \geq B$
$(p * 6) + ((p1) * 9) \geq 512$
$(15 * p) \geq 512$
$p = \frac{512}{15}$
$p = 34$

$(pleaf * (Pr + Ssn)) + P \geq B$
$(pleaf * (7 + 9)) + 6 \geq 512$
$(16 * pleaf) \geq 506$
$pleaf = \frac{506}{16} = 31$

ii

$31 * 0.69 = 21$

iii

$34 * 0.69 = 23$

iv

$\frac{30000 records}{4 records per block} = 7500$ blocks

v

x

i

$(p * P) + ((p1) * Ssn) \geq B$
$(p * 6) + ((p1) * 9) \geq 512$
$(15 * p) \geq 512$

$p = \frac{512}{15}$
$p = 34$

$(pleaf * (Pr + Ssn)) + P \geq B$
$(pleaf * (7 + 9)) + 6 \geq 512$
$(16 * pleaf) \geq 506$
$pleaf = \frac{506}{16} = 31$

ii

$31 * 0.69 \ = 21$

iii

$34 * 0.69 = 23$

iv

$\frac{30000 records}{4 records per block} = 7500$ blocks

v

$512/16 = 32$ records per block
$30000/32938 blocks$
$O(log_2 n)$
$log 30000 = 14.87$ $15 block accesses$

17.19

$[28, 46, 60]$
$[18, 23]$ $[37, 39]$ $[48, 56]$ $[71, 78]$
$[8, 10]$ $[15, 16]$ $[18, 20, 21]$ $[23, 24]$ $[28, 33]$ $[37, 38]$ $[39, 43]$ $[46, 47]$ $[48, 49, 50]$ $[56, 59]$ $[60, 65, 69]$ $[71, 74, 75]$ $[78, 92]$

18.13

b final tree)

$\pi_{Fname, Lname, Address}$
$\downarrow$
$\sigma Dnumber = Dno$
$\downarrow$
$JOIN$
$\downarrow$

$\swarrow$ $\searrow \sigma Dname = Research$
$EMPLOYEE$ $DEPARTMENT$

18.15

No, the AVERAGE and SUM aggregate functions require a dense index. The other functions such as MIN, MAX, COUNT could be used with a nondense index.

19.21

selectivity for Employee 1/10000
selectivity for Department 1/50
selectivity for salary 1/500
number of record pointers for Employee: 10000/2000 5 rows per block
number of record pointers for Department 50/5: 10 rows per block