COMP9315 14s2 | DBMS Implementation

The University of New South Wales

COMP9315 DBMS Implementation
Final Exam 14s2

[Instructions] [Notes] [PostgreSQL] [C]
[Q1] [Q2] [Q3] [Q4] [Q5] **[Q6]** [Q7] [Q8]

Question 6 (11 marks)

Consider a linear hashed file which can hold just 3 tuples in each page (whether a main data page or an overflow page). The file has two parameters: depth, *d*, indicating that the file was size 2^d at the start of the last expansion phase; split pointer, *sp*, containing the index of the next page to be split. The hash function **h()** produces the following hash values for keys `A` .. `T`.

Key	h(Key)
A	...1010
B	...0011
C	...1110
D	...1001
E	...0000

Key	h(Key)
F	...1110
G	...0001
H	...0100
I	...1100
J	...1101

Key	h(Key)
K	...1111
L	...0000
M	...1010
N	...0101
O	...1100

Key	h(Key)
P	...0101
Q	...1010
R	...0111
S	...1000
T	...1110

Assume that a split occurs on every 5th insertion (i.e. just before `E J O, T` are inserted). So, for example, the request `insert(E)` is received, a split occurs, and then `E` is inserted.

Start with a file with two empty pages (*d = 1* and *sp = 0*).

Show the state of the file at the following points:

a. immediately *before* the `insert(E)` request is received
b. immediately *after* the insertion of `E`
c. immediately *before* the `insert(J)` request is received
d. immediately *after* the insertion of `J`
e. immediately *before* the `insert(O)` request is received
f. immediately *after* the insertion of `O`
g. immediately *before* the `insert(T)` request is received
h. immediately *after* the insertion of `T`

Use the following notation for showing the file contents:

```
d = 1, sp = 1
[0] k1,k2,k3 -> k4
[1] k5,k6
[2] k7,k8,k9 -> k10,k11
```

This shows that file has a depth *d* of 1, the split pointer *sp* indicates page 1, page [0] contains three tuples in the main data page and one tuple in its overflow page, page [1] contains two tuples, etc. Each k_i is the key value for a tuple stored in that page.

Using the above notation, the initial empty state of the file would be shown as:

```
d = 1, sp = 0
[0] -
```

```
[1] -
```

After the insertion of `A`, `B` and `C`, the file would look like:

```
d = 1, sp = 0
[0] A,C
[1] B
```

Instructions:

- Type your answer to this question into the file called `q6.txt`
- Submit via: **`submit q6`**

End of Question