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Question 6 (8 marks)

Consider a relation defined as follows:

```
create type Colour as enum
('white','red','orange','yellow','green','blue','indigo','violet');

create table R (
  a integer not null check (a between 0 and 15),
  b Colour not null,
  c integer not null check (c between 1 and 100)
);
```

- a. If the table contains 1000 tuples, and assuming uniform distribution of attribute values, indicate how many tuples are likely to appear in the result of each of the following queries:

- `select * from R where a = 5;`
- `select * from R where b = 'green';`
- `select * from R where c > 80;`
- `select * from R where a is null;`

- b. Consider that we wish to design a *multi-attribute hashing* index for the table, using the following properties:

- the file for the relation has $b = 128$ pages
- query distribution:
 - Q_1 : `select * from R where a = k`, $P_{Q1} = 0.3$
 - Q_2 : `select * from R where b = j`, $P_{Q2} = 0.2$
 - Q_3 : `select * from R where a = k and b = j`, $P_{Q3} = 0.3$
 - Q_4 : `select * from R where b = j and c = m`, $P_{Q4} = 0.2$where k, j and m are constants of the appropriate type

Determine the following:

- the number of hash bits d required (you can assume that the file is not growing)
- the maximum number of hash bits that is useful to allocate to each attribute
- an allocation of hash bits (i.e. values for d_a, d_b, d_c) giving minimum average query cost
- the weighted average cost of queries under this bit-allocation

Show all working.

Instructions:

- Type your answer to this question into the file called q6 . txt
- Submit via: **give cs9315 sample_q6 q6.txt**
or via: Webcms3 > exams > Sample Exam > Submit Q6 > Make Submission

End of Question

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