The University of New South Wales

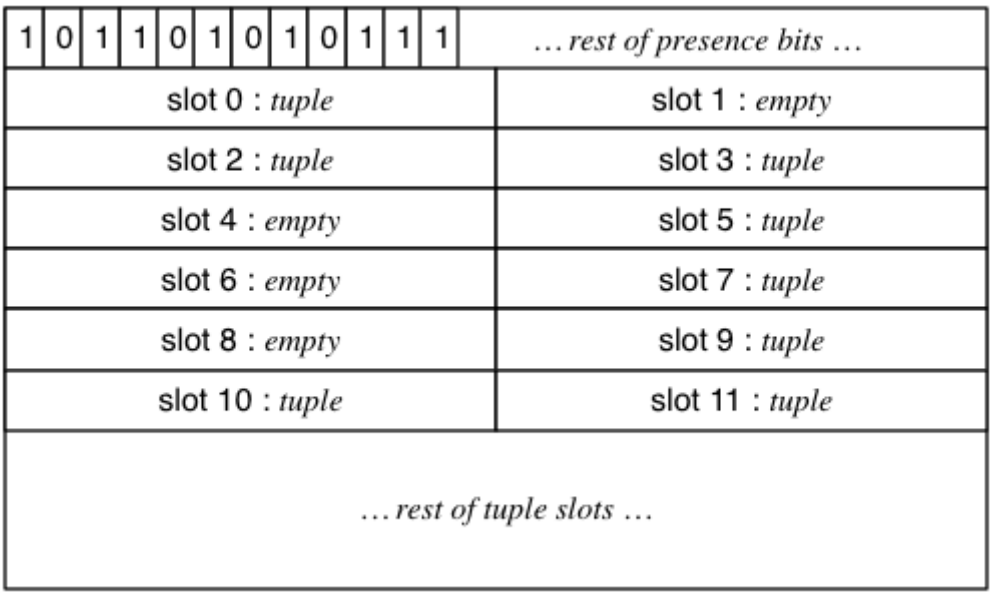
COMP9315 DBMS Implementation
Final Exam 14s2

Question 2 (9 marks)

Consider the following relation:

```
create table Product (
        id          int,
        name        char(25),
        colour      char(10),
        cost        float,
        barcode     char(13),
        released    date,
        primary key(id)
);
```

Tuples from this relation are stored in a file with the following page structure:



Each page contains *N* tuple-slots and has an initial bit-string (*N*-bits in length). Bit *i* in the bit-string indicates the presence (1) or asbence (0) of a tuple in slot *i*.

Assume that

- fields are stored in the tuple in the order they appear in the `create table` statement
- padding is only required before fields of type `int`, `float` or `date`
- each of the data types `int`, `float` or `date` occupies 4 bytes
- pages are 4KB, including both the presence bits and the tuple slots
- there are 10,000 `Product` tuples
- the load factor indicates the average percentage of filled slots per main data page
  (alternatively, you view it as the actual number of tuples as a percentage of the total capacity of the file)
- the load factor can be > 100% (if overflow pages are used)

Based on the above, answer the following questions:

a. How may bytes are needed for each tuple slot?

b. What is the maximum number of tuples that can be stored in each page?

c. If the relation is stored as a heap file, and has a load factor of 90% (i.e. on average, pages are only 9/10ths full), how many pages are needed to hold all tuples?

d. If the relation is stored as a hash file with 100 main data pages plus overflow pages, what is the load factor?

Instructions:

- Type your answer to this question into the file called `q2.txt`
- Submit via: **`submit q2`**

End of Question