CSE 444: Homework 1

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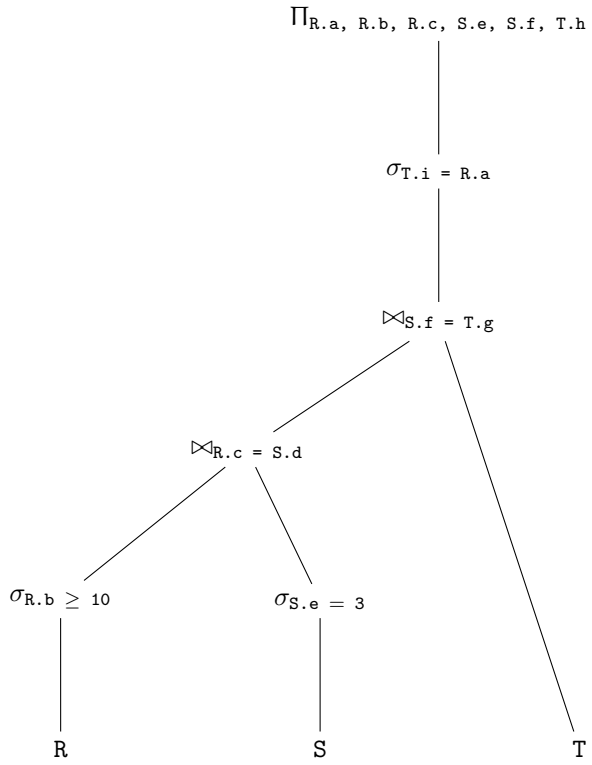
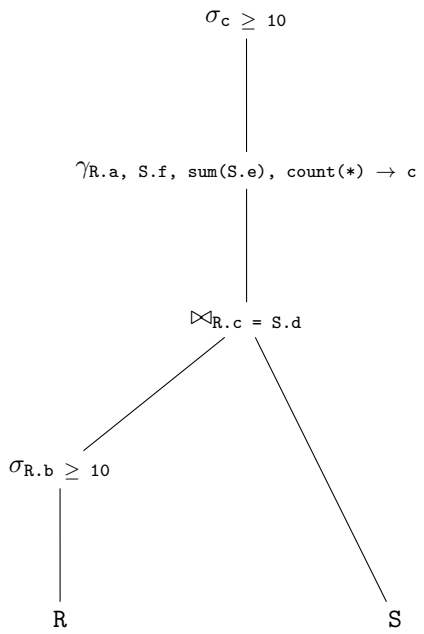
1. Simple SQL and Relational Algebra Review

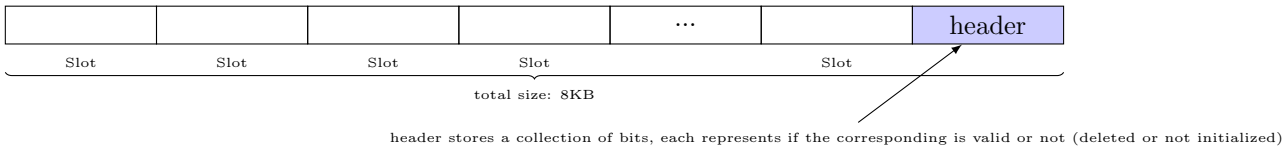
(a) Logical query plan:



(b) Logical query plan:



2. (a) schematic representation:



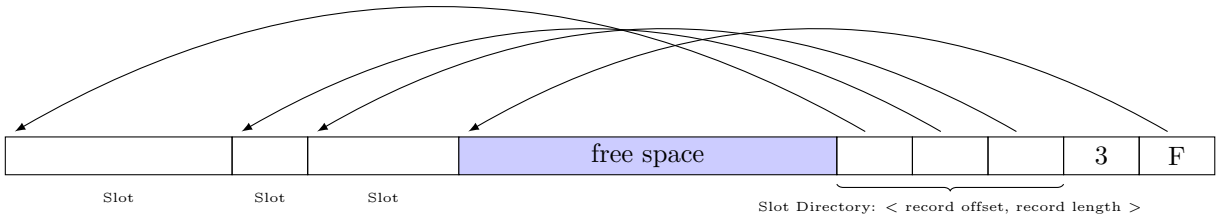
(b) Suppose one page can fit x tuples. We have

$$34x + \frac{x}{8} \leq 8192$$

$$x = \left\lfloor \frac{65536}{273} \right\rfloor = 240$$

240 tuples fit on one page. We need $\lceil \frac{240}{8} \rceil = 30$ bytes for the page header. To fit 1000 tuples, we need $\lceil \frac{1000}{240} \rceil = 5$ pages

(c) schematic representation (3 variable length tuples stored):



3. (a) The project operator calls `next()`, which makes the sequential scan operator call `next()`. Then the heap file iterator interface gets called, which calls the `getPage()` and get the page data from the buffer pool manager.

(b) Since the buffer pool is initially empty, the first `next()` call will pull one whole page containing the data into the buffer pool. So the buffer pool will contain one cached page.

(c) The next `next()` call will get the data directly from the buffer pool's page. So the buffer pool still contains one page.

(d) We know from # 2 one page contains 240 pages. So 1000 calls will need $\lceil \frac{1000}{240} \rceil = 5$ pages to be pulled into the buffer pool.

(e) Since the buffer pool can hold 10 pages. When the query completes, the buffer pool will contains 10 pages which hold the later 2400 tuples.