Fundamentals of Computer Science

Homework Set 8

December 13, 2023

1. (4') Follow the **merge** algorithm presented in Figure 9.15 (Page 408), assuming that one input file contains records with key field values equal to **B** and **E** while the other contains **A**, **C**, **D** and **F**. Please figure out the current record of each input file and list records in the output file **at the end of every while loop** by filling the given table. (Please fill in uppercase letters or "<EOF>" in the eight blanks)

Loop	current record of InputFileA	current record of InputFileB	Records in the output file
1	B	C	A
2	E	C	A B
3	E	D	A B C
4	E	F	A B C D
5	<EOF>	F	A B C D E
/	<EOF>	<EOF>	A B C D E F

2. (4') Suppose a hash storage system is constructed using the division hash function as presented in the textbook but with *six* storage buckets.

a) For each of the following key values, identify the bucket in which the record with that key is placed.

a. 24	b. 30	c. 3	d. 18	e. 15
f. 21	g. 9	h. 36	i. 27	j. 0

Fill the one-digit number (0~5) below.

0	0	0	0	3
3	3	0	3	0

b) The problem here is that the number of buckets being used (6) and the keys have the common factor of 3. In order to generate as few hash collisions as possible, we should use __C__ as the number of buckets instead of *six* (fill the uppercase letter in the blank).

A. 4 B. 9 C. 13 D. 15

3. (2') How many people must be gathered together such that the probability of two members of the group having birthdays on the same day of the year will exceed 50%? (Fill an integer in the form; you can assume that 1) a year consists of 365 days; 2) one's birthday is randomly sampled from a 365-day uniform distribution)

Your Answer:	23	End