DATABASE DESIGN II – 1DL400 – 2022

Assignment 1 (Lab 1)
Extendible Hashing and B+-Tree

Examination

This first assignment gives you the opportunity to practice with indexes. The assignment must be submitted before the indicated deadline **on Studium**. Please notice that you are not expected to finish this assignment during the lab: it may take longer. You must submit the result of this assignment on **Studium** as one single PDF file per group. Please consider that all the submitted assignments will be printed and corrected on A4 paper, so indicate group name, group participants with ID (personnummer, if you have one) and draw readable diagrams. Also make sure that each diagram can fit in one page when printed.

Exercise 1 (Extendible Hashing). Load the records: 2369, 3760, 4692, 4871, 5659, 1821, 1074, 7115, 1620, 2428, 3943, 4750, 6975, 4981, 9208 (in the given order) into an expandable hash file based on extendible hashing. Show the structure of the directory at each step. Show the directory at each step, and the global and local depths. Use the hash function h(k) = K mod 32. Assume that each bucket is one disk block and holds two records.

Exercise 2 (Construction of a B+-tree). Construct a B+-tree for the following set of key values (in the given order):
2, 3, 5, 7, 11, 17, 19, 23, 29, 31. Show (step by step) how the tree is constructed after each addition. Assume that the tree is initially empty and values are added in ascending order. Construct the B+-trees for the cases where the number of pointers (i.e. the **n** parameter) that will fit in one node is as follows:
a. n=4
b. n=6

Exercise 3 (Modifications on a B+-tree). For the B+-tree you constructed in Exercise 2 for n=4 (i.e. with four pointers per node), show the form of the tree after each of the following series of operations:

a. Insert 9.
b. Insert 10.
c. Insert 8.
d. Delete 23.
e. Delete 19.