TU München, Fakultät für Informatik
Lehrstuhl III: Datenbanksysteme
Prof. Alfons Kemper, Ph.D.

Exercise for *Database System Concepts for Non-Computer Scientist* im WiSe 19/20

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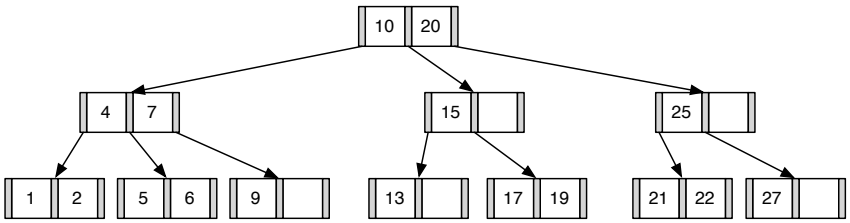
http://db.in.tum.de/teaching/ws1920/DBSandere/?lang=en

Sheet 12

Exercise 1



Insert 14, 18 and then 3 into the depicted B-Tree (degree $i = 1$).

Exercise 2

Give a permutation of the numbers 1 to 24, such that when inserted into an empty B-Tree (degree $i = 2$) the height of the tree (number of layers) of the B-Tree is minimal. Draw the resulting tree.

Exercise 3

Calculate the optimal degree i and the number of required levels (also known as the "height" of the tree) for a B-Tree with the following properties:

- The B-Tree should store all humans currently living on earth (assume an even 10 billion).
- For each human we store the name, country and a unique identifier (100 Byte per human). The unique identifier will be used as the key an requires 8 Byte to store.
- The degree i of inner and leaf nodes may be different.
- Each node has to fit on a 16KB (16000 Byte) page.
- The page ids in the inner nodes require 8 Byte.
- This time (unlike in the lecture), we want to be precise: an inner node with n tuples requires $n + 1$ page ids to identify its children (in the lecture we simplifies this and assumed that a node with n tuples has n page ids).