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Exercises for DW & DM

Sheet 6 (until 14.05.2008)

Please note that you need **50%** of all exercise points to be admitted for the final exams. Exercises have to be turned in until **Thursday** before the next lecture and should be completed in teams of two students each. Write both names and "Matrikelnummer" on each page. If you have multiple pages, staple them together! Please hand in your solutions on **paper** into the mailbox at the IFIS floor or to our secretary (Mühlenpfordtstraße 23, 2nd floor). You may answer in either German or English.

Exercise 1   (5P)

1. What does linearization mean, in the case of multidimensional storage?   (2P)
2. Explain why dimension order is important when storing multidimensional data in a linearized array.   (3P)

Exercise 2   (18P)

1. Considering the R-Tree graphically represented through the MBR with a maximal node size of 3, in Annex 1, perform the following tasks:
   a. Insert, in this order the following data (each of them will be represented as the small red squares): ("08 Qtr2", "b"), ("08 Qtr2", "c"), ("09 Qtr1", "c"). Represent each step graphically, evidenciating the produced split. As split method use the linear cost algorithm and as heuristics, the least enlargement criterion.   (12P)
   b. Draw the R-Tree according to the obtained graphical representation of the MBR, after performing exercise 2.a.   (3P)
   c. Graphically represent (as in the lecture) the following search ([08 Qtr_2, 08 Qtr_3], [a,c)) on both the MBR representation obtained from exercise 2.a, as well as on the R-Tree representation obtained from 2.b.   (3P)

Exercise 3   (7P)

1. UB-Trees:
   a. What is an UB-Tree and why does it use a Z-Curve?   (1P)
   b. How big should Z-Regions be and why?   (2P)
   c. What mechanism can we use to allow hierarchy restrictions and still obtain good performance with UB-Tree based indexes, and how does it work?   (2P)

2. Bitmap indexes:
    a. What is a multi-component bitmap index and why is it useful? (1P)
    b. What is the idea behind range-encoded bitmap indexes and why are they use-ful? (1P)

Annex 1: