

## CS 405G: Introduction to database systems

### Assignment 5

Assigned: Oct. 26, 2007

Due: Nov .7, 2007

**Submission instructions:** Please try to prepare the assignment in word document (hand-written homework is also acceptable). Print and bring them to class on the due date. Put the course number and your name at the top left corner of the first page of your homework. Please follow the rules in the course syllabus regarding late homework and plagiarism.

A parts file with Parts # as the key field will store a list of records of parts. Suppose the search field values of Parts # are inserted in the given order in a B+ tree with fan out size 5 and suppose the database is empty initially. Answer the following questions. Draw B+ trees if necessary.

- 1) What are the minimum and maximum numbers of keys allowed in the root node, internal nodes and leaf nodes respectively in the B+ tree?
- 2) Explain the data structure in each node.
- 3) Construct the B+ tree after the following values: 2, 3, 5, 7, 12, 14, 16, 17, 22, 27, 29, 30, 33, 34, 38, 43 are inserted.
- 4) Grow the B+ tree after 18 and 8 are inserted
- 5) Update the B+ tree after value 9 is deleted.
- 6) Update the B+ tree after 14 and 38 are deleted.
- 7) Write down the nodes needed to be visited to find key 34.

- 8) Write down the nodes needed to be visited to find values in the range [5, 29].
- 9) In case no indexing (B or B+ tree, ISAM) is constructed (available), what's an alternative method that might offer minimum time to find key in question (6) ? Explain why indexing is important in database applications.
- 10) Update the B+ tree when values 7 and 34 are deleted.