Algorithms and Data Structures (IE3, R

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Lab Sheet 5

Lab Task 5 (Searching Algorithms)

Regulations and Lab Report Uploads

- **Private Labtops:** The use of private laptops is encouraged. WLAN access is provided.
- **Lab Teams:** A lab team consists of 2 people who can develop their software in common. Regulation for single workers on request.
- **Responsibilities:** There are 2 problems, one for each member. Decide in the beginning, who will be responsable for which task. This person comments the source code, works out the test cases, writes the report for that task and uploads it. Consider and solve the last task together.
- **Plagiarism:** All ressouces used have to be cited in the documentation AND in the source-code. Text and code has to be quoted properly. *Recommendation:* Right from the start store all used URLs including the access-time in your document working directory.
- **Presentations:** The stack implementations and their test code have to be presented in the beginning of the lab.
- **Missing deadlines:** Please obey the DEADLINE for uploads into the moodle system, usually 6 days after the Lab Date. Repeated uploads are possible, a later upload replaces the earlier one. Each working group is allowed to miss the deadline by three days only once in the term.

Please, upload a **ZIP-file** with the following content:

1. Executable program (exe or jar) for each sorting method that produces a file with the measured data, either directly or through a bat-file that pipes stdout into a file.
2. Source code directories with a project file for compilation - docu tells with which compiler and IDE,
3. Documentation as a single file.

Problem 10 (Basic BST Application)

Be aware of the following facts:

1. A Symbol Table (also called Map) is nothing than an abstraction of a dicionary or of an index in a book.
2. All occurences of a word in a text can be stored in such a Symbol Table (*key* = word, *value* = ArrayList holding all positions in text)
3. The basic Binary Search Tree implementation given in *Sedgewick_AD_07_BasicBST.pdf* is a specialization of the general Symbol Table Interface definied in *Sedgewick_AD_06_SymbolTables_unordered.pdf*.

Provide a good object-oriented **Basic BST** implementation as follows:

- Implement the **put** method and the **get** method, and test it by *storing* in it all occurencies of words in a long text see e.g. http://www.shmoop.com/for-whom-the-bell-tolls/summary.html and by retrieving positions of words in text and of words not present in text!
- Provide an **Iterator** implementation and test it by printing the whole index of occuring words an there positions in text.

Problem 11 (Randomized BST and Tree Depth)

On the basis of the previous Problem:

- Provide the put implementation that achieves a **Randomized BST** and test it with the text.
- Provide a method **depth** that returns the depth of the search tree and compare using it the depth of the basic BST of the previous problem and of the randomized BST here.

- **OPTIONAL:** Measure, for exponentially growing **N (the no. of nodes in the tree)**, namely **N=2^k - 1 for *k*=2,4,6,...,*kmax with kmax=10 or more*** the tree depth. Compare your results for basic and randomized BST and interpret your findings.

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