

**Quiz Sheet No. 2 for *Architecture and Implementation of Database Systems***  
**Prof. Rudolf Bayer, Ph. D.**  
Institut für Informatik  
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Exercises for Chapter 2.4: Prefix B-Trees

1. Consider the following listing of paths from a Windows file system.
  - a) Determine the shortest separators (assuming lexicographic ordering) between these keys. Strike out the parts not needed.
  - b) Determine the partial separators between those keys, which are printed in bold.

notebayer10\c\$\WINDOWS\system32\SNMPAPI.DLL  
notebayer10\c\$\WINDOWS\system32\SNMPSNAP.DLL  
notebayer10\c\$\WINDOWS\system32\SOFTPUB.DLL  
**notebayer10\c\$\WINDOWS\system32\SOL.EXE**  
notebayer10\c\$\WINDOWS\system32\SORT.EXE  
notebayer10\c\$\WINDOWS\system32\SPIDER.EXE  
**notebayer10\c\$\WINDOWS\system32\SPNIKE.DLL**  
notebayer10\c\$\WINDOWS\system32\SPOOLSS.DLL  
notebayer10\c\$\WINDOWS\system32\SPOOLSV.EXE  
**notebayer10\c\$\WINDOWS\system32\SRCLIENT.DLL**  
notebayer10\c\$\WINDOWS\system32\SRRSTR.DLL  
notebayer10\c\$\WINDOWS\system32\SRSVC.DLL  
notebayer10\c\$\WINDOWS\system32\SRVSVC.DLL  
notebayer10\c\$\WINDOWS\system32\SS3DFO.SCR  
**notebayer10\c\$\WINDOWS\system32\SSBEZIER.SCR**  
notebayer10\c\$\WINDOWS\system32\SSDPAPI.DLL  
notebayer10\c\$\WINDOWS\system32\SSDPSRV.DLL  
**notebayer10\c\$\WINDOWS\system32\SSFLWBOX.SCR**  
notebayer10\c\$\WINDOWS\system32\SSMARQUE.SCR  
notebayer10\c\$\WINDOWS\system32\SSMYPICS.SCR  
notebayer10\c\$\WINDOWS\system32\SSMYST.SCR

Exercises for Chapter 3: Query Optimization

2. We are adding an new relation to the database schema on **Part** and **Supplier** in the script (cf. Chapter 3.3, page 5):

```
create table Description
(P#          string,
 Name       string,
 Material   string,
 Weight    real)  key is P#
```

- a) Formulate a query in SQL that retrieves the Name, QTY and PRICE of parts weighing less than 10 kg (selectivity: 0.3) that are supplied by companies in Munich (8 suppliers in Munich) and cost less than 100 \$ (selectivity: 0.7).
- b) Reformulate the same query using relational algebra.
- c) Sketch an operator tree for this query. Split the predicate in the WHERE clause into selection and join predicates which can be pushed down in the operator tree.
- d) Optimize the operator tree.
- e) What are the most costly operations? Assume that:  
|Part| = 90,000  
|Supplier| = 150  
|Description| = 30,000
- f) How can secondary indexes be used to speed up query execution? Suggest appropriate indexes.