

**Algorithm Design**  
*M. T. Goodrich and R. Tamassia*  
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**Solution of Exercise C-3.30**

To implement an efficient ordered dictionary, we can use a hash table with separate chaining. By using this data structure, we will be able to group together all elements with the same key—they will all be chained together. The chains will also be sorted, so as to help with the ordered structure. In this system, all ordered dictionary operations can be handled in  $O(\log k + s)$  expected time - a quick hash to the right spot in the table (constant time) plus a quick search through the chain to find the correct element (which takes  $O(\log k)$  time).