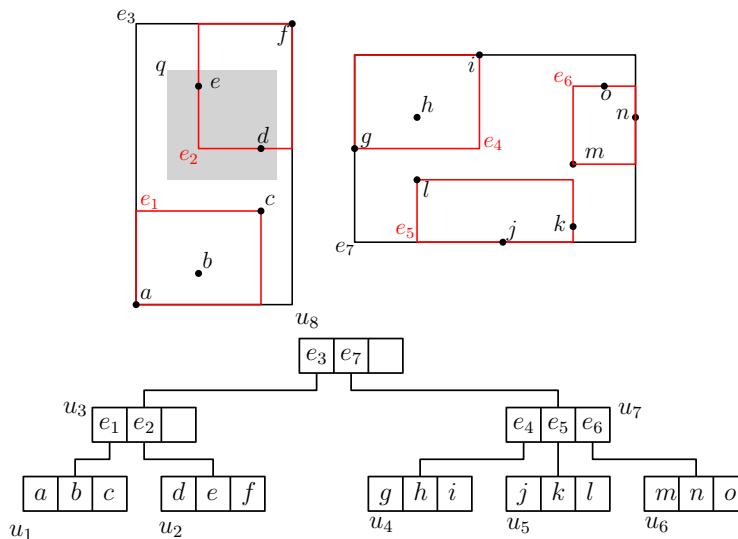


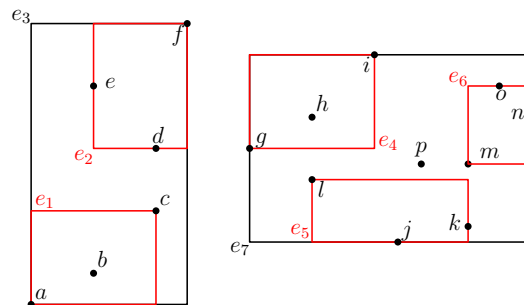
INFS 4205/7205: Exercise Set 1

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Problem 1. The following figure shows a set of points (labeled a, b, \dots, o) and also the corresponding R-tree. List all the nodes that need to be accessed in order to answer the range query whose search region is the shaded rectangle.



Problem 2. The figure below shows the MBRs of the R-tree in Problem 1 together with a new point p . Draw the MBRs of the R-tree after the insertion of p . Assume that each node can accommodate at most $B = 3$ elements.



Problem 3. Consider once again the R-tree in Problem 1. Give a range query that returns an empty result but needs to access 6 nodes of the tree.

Problem 4. Give an $O(B \log B)$ -time implementation for the leaf split algorithm discussed in the class, where B is the maximum number of points in a leaf node.

Problem 5. Give a counterexample showing that the leaf split algorithm discussed in the class does not give an optimal split. (Hint: set $B \geq 6$.)