My interviews with Amazon

At the end of my internship at Amazon, I had two rounds of interviews for pre-placement offer.

Round 1
1.Given an array of integers and a number k, write code to find maximum of all contiguous subarrays of size k.
Solution: http://www.geeksforgeeks.org/archives/11306
http://shashank7s.blogspot.in/2011/06/given-array-and-integer-k-find-maximum.html
I gave the solution using deque.

2.Write code to find diameter of a binary tree. (Diameter is the number of nodes on the longest path between two leaves in the tree)
Solution: Recursive function, http://www.geeksforgeeks.org/archives/5687

Round 2
This round was mostly design type of questions.
1.Given an array of 1's and 0's, sort it in place, with no extra memory.
Solution: http://techpuzzl.wordpress.com/2010/01/10/sorting-array-of-0s-and-1s/

2.Serialize a n-ary tree (a tree in which a node may have any number of children) and write it to a file. Read it, deserialize it and reconstruct the original tree. Write pseudocode for this.
Solution which I told:* Start with the root node. Assign an id to it. Traverse in-order. As each node is encountered, assign id to its children (probably with a counter-like static variable). Go to a new line on the file, write the id of current node, value contained in the node and its children's ids on the file. Have appropriate separator characters. When writing code, take care of NULL nodes. The ids must be given continuously. for (eg) 0 for the root, 1 for the leftmost child of the root, 2 for the second child of root and so on.

For deserialization, create a root note (if file is not empty). Read the file line by line. For each line, create the children nodes, from the information read in the line. Do it recursively, in order. Note that, the info about a node of id 'i', is found at the 'i'th line of the file.

3.Place dustbins on an irregular plane optimally, such that, any point on the plane should have a dustbin within a distance 100 meters from it.
Solution which I told:* Form a hexagonal grid on the plane, and place dustbins at the center of each hexagon. The hexagons should be regular, and the distance from the center to a corner point should be 100 meters.

4.A stream of strings keep arriving in your system. At any instant, maintain the top 5 most frequent strings that arrived in the last one hour. The rankings should update at minute level granularity.
Solution which I told:* Maintain a double ended queue which contains the strings that came in the last one hour. Every minute, as the strings come in, insert them into the double ended queue, along with a timestamp. As the timestamp gets expired, remove the strings from the other side of the queue. At the same time, maintain a table which keeps count of strings currently in the queue. As and when we insert or delete strings from the queue, update the count of strings in the table accordingly. Rows of the table must be sorted by count of strings. As the count is updated, the rows also must be reordered.

** The last three questions were design questions. They may have a variety of answers. I'm actually not sure of the solutions I've given. These questions may have better solutions.*

Feel free to contact me in case of queries. All the best for your interviews :)