Data Structures:

1. What data structure would you use to implement a company address book of employee names.
   1. What is the run time for lookup, add and remove?
   2. Why did you use this data structure?
2. Describe what a hash table is and how it is implemented.
   1. What is the runtime lookup?
   2. How are collisions handled?

Performance:

.Net. Describe a time when you had a high performance server system in .NET and how did you manage memory & GC? Can you describe how the CLR GC works (Gen2, Gen1, Gen0)?

Memory (for C++ candidates. For .NET, ask about thread vs. process & memory)

1. What is the difference between a stack and a heap?
2. Where are the stack and heap stored?
3. Which is faster? The stack or the heap and why?
   1. Answer: Stack. Simple pointer increment.
4. How to allocate on the stack vs. the heap?
5. How do threads interact with the stack and the heap? How do the stack and heap work in multithreading
   1. Looking for each thread has own stack, but all threads share the heap.
6. When are objects on the stack and heap deleted?
7. In C++, how do you prevent a class from being allocated on the heap?

private:

void\* operator new(size\_t); // standard new

void\* operator new(size\_t, void\*); // placement new

void\* operator new[](size\_t); // array new

void\* operator new[](size\_t, void\*); // placement array

1. How would you prevent a class from being allocated on the stack?
   1. Make d’tor private and offer a destroy method that calls “delete this;”

Coding: <http://collabedit.com/er66h>

1. Determine if a binary tree is symmetrical.

t1          t2

   a     |     a

  / \    |    / \

 b   c   |   c   b

/ \      |      / \

d   e     |     e   d    return true

   a     |     a

  / \    |    / \

 b   c   |   x   b

/ \      |    \   \

d   e     |     e   d    return false

1. Determine if a string is a valid number.

public bool IsNumberValid(string num)

1. Implement atoi.

public int atoi(string num)

1. Find the largest repeating substring.

// input: “Ask not what your country can do for you; ask what you can do for your country”

// output: “ can do for you“

public string FindLongestRepeatingSubstr(string phrase)

5) Find the intersection node between 2 linked lists. Do this in O(n) time and O(1) memory.

class Node

{

public int value;

public Node next;

}

1->2->4->3->9->10->null

/

7->6->5-