

CPSC 530 - Information Theory and Security  
Group 17 Project Quiz

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## Quiz Questions and Answers

**Q1:** What specific type of Binary Tree is used in the implementation of the BCCBT Data Compression Algorithm? Describe at least one discussed property of this type of Binary Tree.

**A1:** The specific type of Binary Tree used is a **Complete Binary Tree**. The relevant properties of this type of Binary Tree that will be discussed during our presentation are as follows.

- In a Complete Binary Tree all levels, EXCEPT potentially the last level, are completely full.
- In a Complete Binary Tree nodes are filled in from left to right at each level.
- In a Complete Binary Tree the number of nodes at level  $n$  is  $2^n$ .

**Q2:** Given the specific binary tree needed for the BCCBT algorithm, where the tree's nodes correspond to symbols in an arbitrary alphabet  $\Sigma$ . Denote a symbol  $\phi$ , such that  $\phi$  is in our arbitrary alphabet  $\Sigma$ . Note,  $\phi$  is **NOT** the root of the tree. How is the bit code generated for the symbol  $\phi$ ?

**A2:** To find  $\phi$ 's bit code, we start at the root of the complete binary tree and traverse the tree until we reach the node corresponding to  $\phi$ . At each step, append the weight of the edge we are traversing to our code. We stop encoding once we reach  $\phi$  in the tree.

**Q3:** Does the BCCBT Data Compression Algorithm make use of the frequency/probability of each unique symbol in the source file? Explain why or why not.

**A3:** Yes it does. This is because the algorithm requires the frequencies of each unique symbol in order to construct a frequency table which in turn is used to initialize the Complete Binary Tree, which is the core feature of this algorithm.