

National Institute of Technology, Calicut
Department of Computer Science and Engineering
CS2094D – Data Structures Lab
Assignment-1 b (Advanced Batch)

Policies for Submission and Evaluation

You must submit your assignment in the moodle (Eduserver) course page, on or before the submission deadline. Also, ensure that your programs in the assignment must compile and execute without errors in Athena server. During evaluation your uploaded programs will be checked in Athena server only. Failure to execute programs in the assignment without compilation errors may lead to zero marks for that program.

Your submission will also be tested for plagiarism, by automated tools. In case your code fails to pass the test, you will be straightaway awarded zero marks for this assignment and considered by the examiner for awarding F grade in the course. Detection of ANY malpractice regarding the lab course will also lead to awarding an F grade.

Naming Conventions for Submission

Submit a single ZIP (.zip) file (do not submit in any other archived formats like .rar or .tar.gz). The name of this file must be ASSG<NUMBER>_<ROLLNO>_<FIRSTNAME>.zip (For example: ASSG4_BxxyyyyCS_LAXMAN.zip). DO NOT add any other files (like temporary files, input files, etc.) except your source code, into the zip archive. The source codes must be named as ASSG<NUMBER>_<ROLLNO>_<FIRSTNAME>_<PROGRAM-NUMBER>.<extension> (For example: ASSG4_BxxyyyyCS_LAXMAN_1.c). If there is a part a and a part b or a particular question, then name the source files for each part separately as in ASSG4_BxxyyyyCS_LAXMAN_1b.c.

If you do not conform to the above naming conventions, your submission might not be recognized by some automated tools, and hence will lead to a score of 0 for the submission. So, make sure that you follow the naming conventions. Standard of Conduct Violations of academic integrity will be severely penalized.

Each student is expected to adhere to high standards of ethical conduct, especially those related to cheating and plagiarism. Any submitted work MUST BE an individual effort. Any academic dishonesty will result in zero marks in the corresponding exam or evaluation and will be reported to the department council for record keeping and for permission to assign F grade in the course. The department policy on academic integrity can be found at: <http://cse.nitc.ac.in/sites/default/files/Academic-Integrity.pdf>.

Assignment Questions

1. Write a program to find the Huffman encoding for a given message using binary tree. Input should be read from the file **input.txt** and output should be written to the file **output.txt**. Your program should include the following functions:

Find_huffman_Code(m) – It should build a Huffman tree for the given message **m** and assign codes by traversing the Huffman Tree. Path from the top or *root* of this tree to a particular node/character will determine the code group associated with that node/character.

print_Codes (m) – This Function should display the final code-word corresponding to each character in the message **m**.

Input File Format:

The input consists of multiple lines, each line of the input contains a string.

Output File Format:

The output (if any) is code words for each characters in the message separated by a space.

Sample Input:

malayalam

mississippi

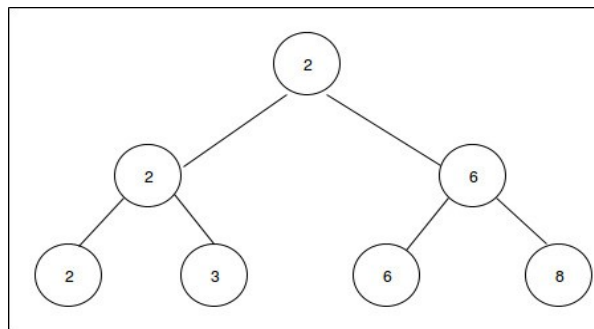
Sample Output:

01 1 000 1 001 1 000 1 01

11 00 00 1 00 00 1 010 010 1

2. Write a program to find the second best player in a tournament with a team of N players.

Hint: use a tournament tree (Binary Heap). Tournament tree is a form of min (max) heap which is a complete binary tree. Every external node represents a player and internal node represents winner. A node in the tree has 2 or 0 children and a parent node value is the minimum value among the two children. In a tournament tree every internal node contains winner and every leaf node contains one player.



The above tree contains 4 leaf nodes that represent players and have 3 levels 0, 1 and 2. Initially 2 games are conducted at level 2, one between 2 and 3 and another one between 6 and 8. In the next move, one more game is conducted between 2 and 6 to conclude the final winner. Overall we need 3 comparisons. For second best player we need to trace the candidates participated with final winner up to level 2 that leads to 3 as second best.

Input should be read from the file **input.txt** and output should be written to the file **output.txt**. Your program should include the following functions:

tournament_Tree () - It should build a tournament tree and finds the second best player.

Input File Format

The input consists of multiple lines, each line of the input contains a sequence of integers separated by space.

Output File Format:

The output (if any) is the second best player from the sequence of numbers.

Sample Input:

2 3 6 8

10 15 4 5 6 7 8 9

Sample Output:

3

10