Introduction to Computing

Breaking the Ice

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Let's have some fun!!!

You are given n ropes of lengths $l_1, l_2, \ldots, l_n$ respectively. The ropes need to be tied together to form one long rope. At a time, you can only tie two ropes together. Let the cost of tying two ropes together is equal to the sum of their lengths. Write a program that takes $l_1, l_2, \ldots, l_n$ as inputs and prints the minimum cost of joining the ropes together into a single one.

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Example:
Let us assume $l_1 = 5$, $l_2 = 11$ and $l_3 = 7$. Then we have

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Cost((5+11)+7) = 16 + 23 = 39,
Cost((5+7)+11) = 12 + 23 = 35,
Cost((7+11)+5) = 18 + 23 = 41.
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What we learnt?

Solving a problem on a computer requires:

1. Understanding the logical actions (strategies) to take.
2. Choosing the best strategy.
3. Finding out the best implementation of the chosen strategy.

The SALADS approach

"Think, Think, Practice Thinking."

– Ritwik Ghatak, Indian Filmmaker

S	Shape (the problem into a version expressible by a computer)
A	Ask (questions)
L	Logify (the solution of the problem)
A	Algorithmically (formulate the working principle)
D	Data Structures (are to be chosen appropriately)
S	Scrutinize (the program for testing and verification)

Topics to be covered

- Basics
- Computer Fundamentals and Hardware
- Mathematics for Computing
- Programming in Python
- Algorithms
- Data Structures

Course Webpage

https://www.isical.ac.in/~malaybhattacharyya/Courses/In2Comp/Fall2024

Resources

Books

1. D. E. Knuth, The Art of Computer Programming, Volumes 1-4, Pearson Education.
2. R. G. Dromey, How to Solve it by Computer, Pearson Education.
3. Mark Lutz, Learning Python, O'Reilly.
4. Michael T. Goodrich, Roberto Tamassia and Michael H. Goldwasser, Data Structures and Algorithms in Python, Wiley.
5. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, Data Structures and Algorithms, Pearson.
6. E. Horowitz and S. Sahni, Fundamentals of Data Structures, Universities Press.
7. T. A. Standish, Data Structure Techniques, Addison Wesley.

Competitive programming

ACM ICPC Past Problems
`https://icpc.global/worldfinals/past-problems`

Evaluation

- MID-SEMESTER - 30
- SEMESTER - 50
- ASSIGNMENT - 10 (Scribe + Programming Test)
- PROJECT - 10
- BONUS (For submitting weekly assignments)

Hometasks

- Open an account on GitHub – You need to keep your codes in a repository
- Open an account on Overleaf – You need to scribe for this course