

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, \dots, 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, \dots, 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

$$\text{Cost}((5+11)+7) = 16 + 23 = 39,$$

$$\text{Cost}((5+7)+11) = 12 + 23 = 35,$$

$$\text{Cost}((7+11)+5) = 18 + 23 = 41.$$

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