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Launchpad

Lecture - 8

Recursion

Aman Bahl

Status of Assignment?

Any doubts?

Warmup! (15 minutes)

I. Sort an array which has two halves sorted.
   I. You can use a second array to store the intermediate results

Void *merge_sorted_halves(**int** A[], **int** start, **int** mid, **int** end);*

Call Stack!

Time to talk about Recursion!

What is Recursion?

Recursion in computer science is a method where the solution to a problem depends on solutions to smaller instances of the same Problem.

Parts of Recursive Algorithm

I. Base Case (i.e., when to stop)
II. Work toward Base Case
III. Recursive Call (i.e., call ourselves)

The "work toward base case" is where we make the problem simpler. The recursive call, is where we use the same algorithm to solve a simpler version of the problem. The base case is the solution to the "simplest" possible problem

Print Factorial of N

I. What is the recursive call?
II. What is the base case?

Print Nth Fibonacci Number

I. What is the recursive call?
II. Base Case?

Behind the scenes!

GCD using Euclid's Method

I. Recursive Call?
II. Base Case?

Recursive Data

We can think about our data as a recursive data for e.g.

I. A string is a character followed by another string. Base case – if character null, it is empty string
II. An array is a element followed by another array.
III. A number is a digit followed by another digit

These are just few ways to think about it. You can also in some different lines like an array is combination of two arrays [Binary Search].

Key concepts

When we think about recursion all you need to think about are these important things.

I. Arguments for next recursive call i.e given some data, what are you passing to recursive call.
II. Handling return value from the recursive call.
III. What you will return after the recursive call.
IV. What are your base cases and what steps you will perform there and what will you return from there.

Lets code some more problems

I. Print reverse of a String
II. Sum of Array
III. Binary Search
IV. Selection Sort

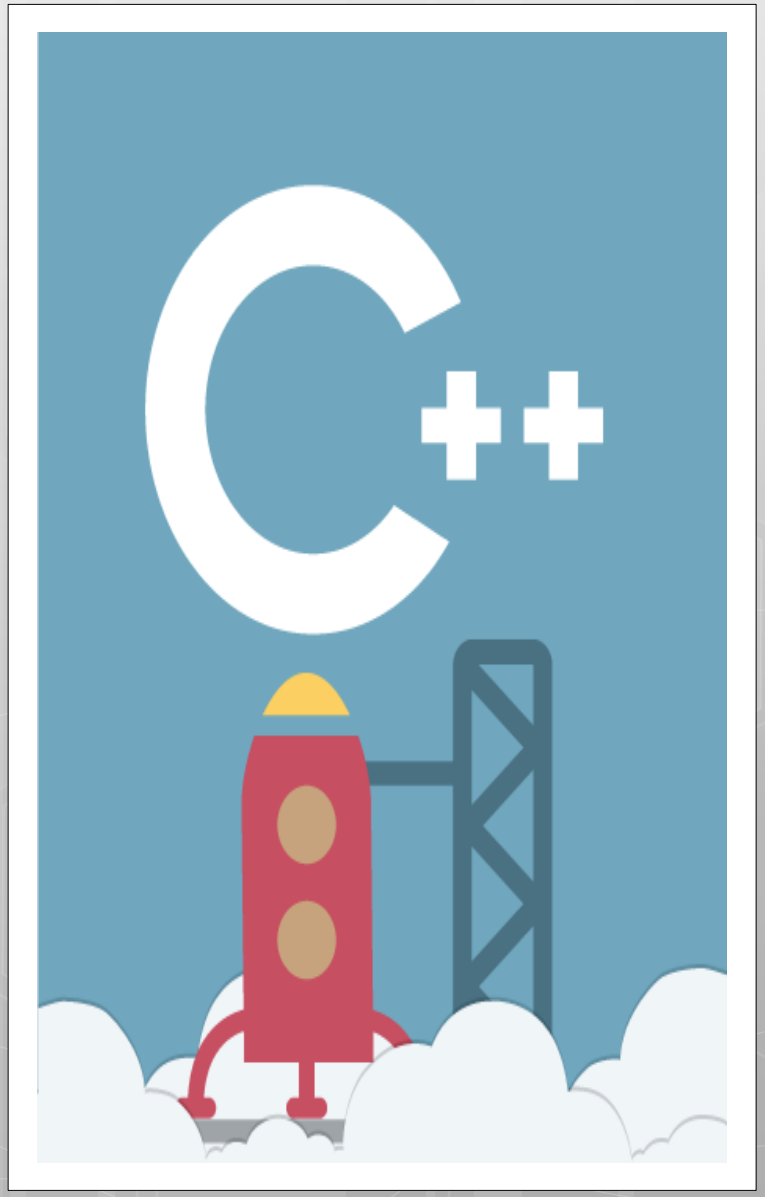
Time to try?

I. Write a program to calculate power (a^x) using recursion
II. Reverse an array using recursion.
III. Write a program to check if a given string is palindrome or not using recursion!
IV. Bubble Sort using recursion.

Merge Sort!

What is next class about?

I. More into recursion.



Thank You!

Aman Bahl

aman.or.b@gmail.com
+91-9908124628