

July 21, 2015

Launchpad

Lecture - 4

Programming Fundamentals
- 4

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Status of Assignment?



Any doubts?



Warmup? (20 min)

What is the maximum number of squares of size 2×2 that can be fit in a right angled isosceles triangle of base B .

One side of the square must be parallel to the base of the isosceles triangle.

Base is the shortest side of the triangle

For e.g. :

$1 - 0$, $2 - 0$, $3 - 0$, $4 - 1$, $5 - 1$, $6 - 3$, $7 - 3$, $8 - 6$



Other Language Constructs

- I. do while
- II. switch case
- III. Tertiary operator (? :)

Time to talk about functions?



What is a function?

- I. A function groups a number of program instructions into one unit and gives it a name. This can then be invoked from other parts of the program.
- II. It adds conceptual organization and increases reusability of the code.



Lets move some programs to functions!

- I. Write function to print a table of Fahrenheit to Celsius table from 0 to 300.
- II. Lets convert the above to take limits from the user.
- III. Write a function to check if a number is prime or not.
- IV. Use above in another function to generate all prime numbers from 2 to N, where N is given by user.

So a function looks like :

```
type name ( parameter1, parameter2, ...) {  
    statements  
}
```

- I. **type** is the type of the value returned by the function.
- II. **name** is the identifier by which the function can be called.
- III. **parameters** (as many as needed): Each parameter consists of a type followed by an identifier, with each parameter being separated from the next by a comma. Each parameter looks very much like a regular variable declaration (for example: `int x`), and in fact acts within the function as a regular variable which is local to the function. The purpose of parameters is to allow passing arguments to the function from the location where it is called from.
- IV. **statements** is the function's body. It is a block of statements surrounded by braces `{ }` that specify what the function actually does.

Call Stack?



Scope of Variables?



Call by value?



More about functions

- I. A function generally has three parts
 - I. Declaration
 - II. Definition
 - III. Invoking
- II. Declaration is optional if function is defined above `main()`
- III. A function needs to be defined or declared before it can be called i.e. if you are calling a function `A()` in function `B()` then `A` should be declared or defined above `B`.



Passing Arrays into a function!



Lets do some more problems?

- I. Write a function which takes an array and its length as argument and returns sum of its elements.
- II. Write a function which takes an array as argument and sorts them using selection Sort.
- III. There are two sorted arrays. First one is of size $m+n$ containing only m elements. Another one is of size n and contains n elements. Write a function to merge these two arrays into the first array of size $m+n$.



Insertion Sort?



Binary Search?



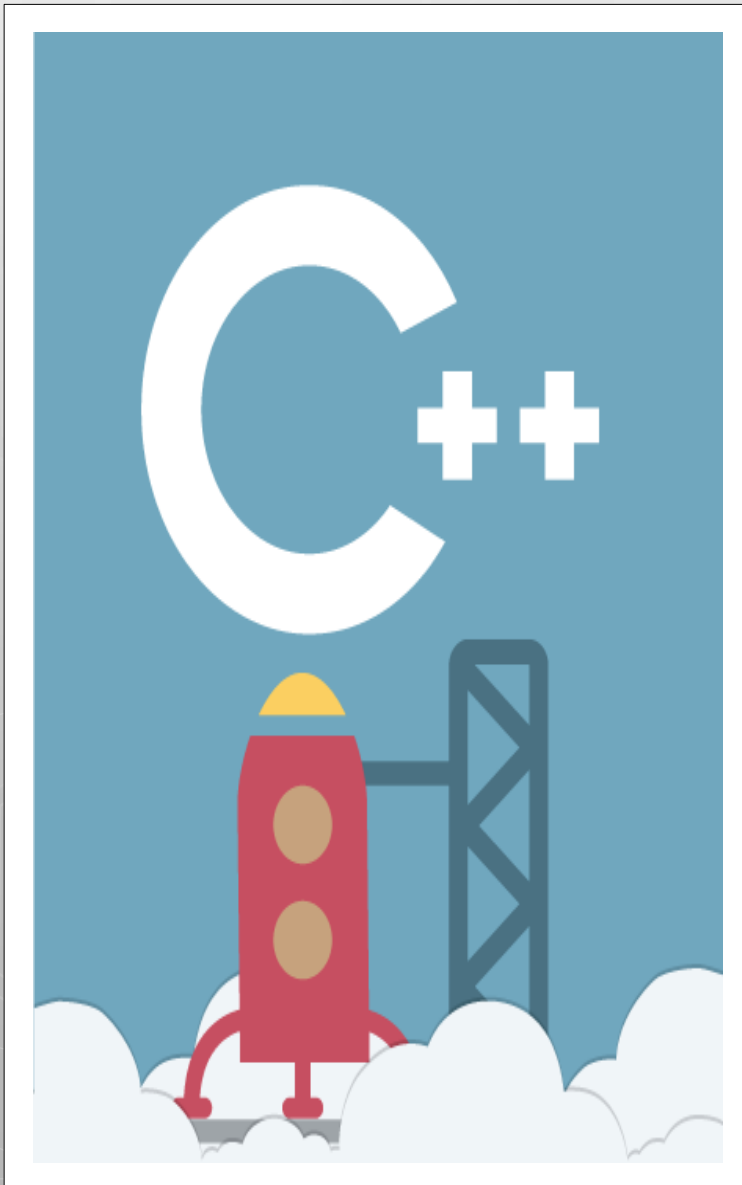
Time to try?

- I. Binary Search
- II. Write a function which takes a number X and an array and prints all pairs which sum to X .
- III. Write a function which takes two sorted arrays, and their lengths as arguments and returns combined median of them without using the third array.
- IV. Implement Insertion Sort.



What is next class about?

- I. Arrays contd...



Thank You!

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