

CS 101 Computer Programming and Utilization

Lecture 8

Functions and Reuse

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Revision: arrays and the for loop

- The for loop
 - Initialization first
 - Then the termination condition
 - Then the body
 - Then the step
- Flat for loops and arrays
 - Traverse once over arrays
 - Nested for loops
 - The index of outer for loop
 - Index of inner for loop
- Flow chart of the for loop
- Array storage
 - Must be allocated before one starts using its member elements
 - Size of array must be known to get memory allocated to it
 - Once allocated, locations cannot be deleted and locations cannot be added.
 - Once allocated array size does not change
- Array index out of bound errors
- Array elements as lvalue and as rvalue

Giving a name to your code

- 'main' is a name given to a body of code
- But we don't use that name anywhere in our program
 - This name is just a name 'recognized' by the compiler as a special body of code
- What are the possibilities that will be opened up for us if we could give names to our code bodies?

A familiar situation

- Recall the programs that you wrote for computing π and e
 - Some of you computed the values of factorial terms in each iteration
 - This can be avoided by giving a name to that code and simply using it as 'black box'
 - Of course the expected solution in that assignment was to use the result of the previous term since the new term could be easily computed in terms of the previous term

What's in a name?

- An object associated with the name
- A use of the name to refer to the object..we don't need the complete description
- If we give a name to something, we can easily refer to that something
 - Sometimes names are numbers (indices) or encodings!
 - Names to people, places, rivers, countries, movies, books, recipes, companies, colleges, departments, musical scores, trees, animals, newspapers, products, events, languages, elements, theorems, ..activities, processes, procedures, ...

Names in Programs

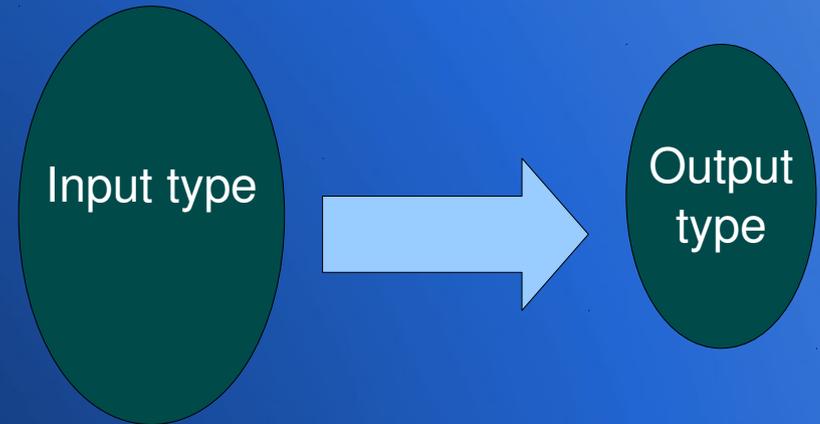
- So far we have used following names/identifiers
 - Names of types: int, float, char
 - Names of objects of those types: x,y,a,i,A
- We can also write code bodies and give them names
 - Just like we used the name 'main' to indicate the code body that is to be executed when the program starts executing

Two basic names that get used to refer to code bodies

- Procedure
 - Any named sequence of statements
- Function
 - A procedure, but it follows certain characteristics
 - Just like mathematical functions
 - Many inputs one output
 - Not all procedures are functions

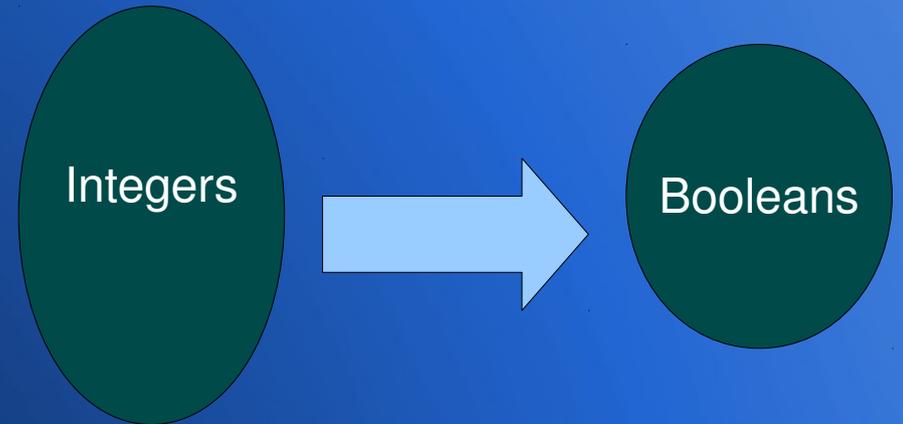
Functions

- Many inputs
- One output
- Output computed in terms of the input



Int --> boolean

- Input is an integer
- It's mapped to a boolean value
 - The result is a boolean
- The function follows some logic for the mapping
 - This logic makes the code body of the function in a program



Functions in Programs

- Declaration
 - Define the name, input types, output type
- Definition
 - Define the body
 - Follow types specified in the declaration
- Invocation/Call
 - Use the function it by passing parameters, which are values of types specified as input types
 - Use the result
 - By assignment
 - By linking it as input value to another function call