PROGRAMMING FOR MECHANICAL AND INDUSTRIAL ENGINEERS MIAE-215 Section T TB

EIGHTH TUTORIAL

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Functions

- Functions are chunks of code that run only when it is called
- Highly utilized for reducing repetitive code and reusing that code
- Defining a function in C++:
  - The return type of the function: void, int, bool, char, double…
  - Function name: my_function, (any non-generic name can be used)…
  - Arguments/Parameters: similar to ‘x’ in the function ‘f(x)’
- E.G.: bool is_prime(int num), int square_num(int num), ….
- Pre-defined C++ Function: **int main(){}**

Functions (cont'd)

- User-defined functions are not executed unless called in the main function (directly or indirectly)
- To call a function: function name + (arguments in brackets or brackets only if no args)
- EXAMPLE: is_prime(2); square(10)…
- Since some functions represent a value, they can be treated similar to variables
- **Prototypes (declaration then definition) help with code optimization and organization**

Functions Overloading

- Functions are most useful when they are made modular
- Functions overloading: One function name that can have different return types, arguments and implementations
- Overloading is only feasible when the re-defined function is distinct
- Alternatively related (not in scope of the course): *Templates*
- https://cplusplus.com/doc/tutorial/functions2/

PBV vs PBR

- **Arguments/Parameters can either be pass-by-value or pass-by-reference**
- **Pass-by-value:** the argument makes a copy of the passed variable value and uses it
  - The value of the passed variable is unaffected outside the function
- **Pass-by-reference:** the argument becomes a reference to the passed variable
  - The value of the passed variable can change accordingly
- In PBV only the value is provided while in PBR the memory location is provided
- https://www.educative.io/answers/pass-by-value-vs-pass-by-reference

Function calls

- **A function defined globally can be called anywhere**
- In competitive programming, one can make new functions from multiple other functions
- **Activity:** Double triangle
  - Function 1:
    - A) *type* upperTriangle(string str);
    - B) *type* upperTriangle(char arr[]);
  - Function 2:
    - A) *type* lowerTriangle(string str);
    - B) *type lowerTriangle(char arr[])*
  - Function 3: *type* doubleTriangle(string strU, string strL, char c)

Default Values & Static Storage

In programming, user behaviour is unexpected

- So, it can be a good practice to provide default cases
- In functions, parameters can have default values
- E.G., int divide(int a, int b=2); void printS(string str, int count=1);

The 'static' keyword can provide tracker variables in functions

- If a variable is set static in a function, its value is stored after each function call
- **Activity:** void printCalls();

References

- https://www.educative.io/answers/pass-by-value-vs-pass-by-reference
- https://cplusplus.com/doc/tutorial/functions2/
- **https://github.com/TheBarzani/COEN243_Fall2022**

THANK YOU ☺