C Programming Basics

SDS 322/329

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Recap

- Functions in C
  - Standard library functions
  - User-defined functions
  - Passing command-line arguments to the `main` function
  - In-class exercise

Overview of the Course

- Writing a Basic C Program
- Understanding Errors
- Comments Keywords, Identifiers, Variables
- Operators
- Standard Input and Output (Basic)
- Control Structures
- Standard Input and Output
- Arrays, Structures
- Functions in C
- Pointers
- Working with Files

All the concepts will be accompanied with examples.

In-Class Exercise -1

- Write a function named **`sumN`** that calculates the sum of first **`N`** natural numbers
  - The function should accept an integer value as input
  - The function should return an integer value that is equal to the sum of first **`N`** natural numbers
  - The formula for calculating the sum of first **`N`** numbers is: (N*(N+1))/2
- Call the function **`sumN`** from the **`main`** function thrice
  - First time you invoke the function, pass 10 as the value of **`N`**
  - Second time you invoke the function, pass 15 as the value of **`N`**
  - Third time you invoke the function, pass 20 as the value of **`N`**
- Print results from the program as follows

```
sum of first 10 numbers is 55
sum of first 15 numbers is 120
sum of first 20 numbers is 210
```

In-Class Exercise -2

- Modify the program in Exercise-2 to accept the values of N interactively from the user
  - Hint: Use **`scanf`** thrice to read the values of N

In-Class Exercise -3

- Modify the program in Exercise-2 to accept the values of N from command-line
  - Hint: change the signature of **`main`**

Strings in C

- A string in C is an array of characters
  - `char myName[50];`
- Strings have a terminating null character: '\0'
  - A string with the contents "CAT" has four characters: 'C', 'A', 'T', and the terminating null character
  - The terminating null character has the value zero
- Some of the commonly used string functions from **`string.h`** are
  - strcat - concatenate two strings
  - strcmp - compare two strings
  - strcpy - copy a string
  - strlen - get string length
  - strchr - string scanning operation
  - strstr - find a substring
  - strtok - split a string into tokens

Using String Length Function

```c
#include <stdio.h>
#include <string.h>

int main(){
  int length;
  char animal[50];
  printf("\nWhat is your favorite animal?\n");
  scanf("%s", &animal);
  length= strlen(animal);
  printf("\nSpelling of this animal has %d chars\n", length);
  return 0;
}
```

In-Class Exercise - 4

- Write a program to find if a sequence of characters is a substring of another given sequence
  - Prompt the user for a string, `sequence2`
  - Find out if `sequence2` is a subsequence of `sequence1` where `sequence1` is: "AGTCGGGTCGAGTCGTTGATCAGTCGGGTCGAGTCGTTGA"

Solution to In-Class Exercise-4

```
#include <stdio.h>
#include <string.h>
int main(){
    char sequence1[]="AGTCGGGTCGAGTCGTTGATCAGTCGGGTCGAGTCGTTGA";
    char sequence2[100];
    int test=0;
    puts("\nEnter the subsequence to search:\n");
    gets(sequence2);
    if(strstr(sequence1, sequence2) != NULL){
        printf("\nsequence2 is a subsequence of sequence1\n");
    }else{
        printf("\nsequence2 is NOT a subsequence of sequence1\n");
    }
    return 0;
}
```

References

- C Programming Language, Brian Kernighan and Dennis Ritchie
- Let Us C, Yashavant Kanetkar
- C for Dummies, Dan Gookin
- http://cplusplus.com
- https://en.wikibooks.org/wiki/C_Programming/Strings