IT206 : Data Structures and Algorithms Lab - 1
30/07/2019

Note:

1. **The objective of the lab is to make students learn the difference between recursive and iterative algorithms.**
2. **It is a prerequisite concept to learn data structures.**
3. **Lab programs on basic searching and sorting are included.**
4. **Students may use C++/Java for implementation.**
5. **Each program will have two versions of implementation : Iterative and Recursive**

Basic concept:

An **Iterative algorithm** will use looping statements such as for loop, while loop or do-while loop to repeat the same steps while a **Recursive algorithm,** a function calls itself again and again till the *base condition*(stopping condition) is satisfied.

Example:
Find the sum of n natural numbers:

Iterative approach (function):

```
int sum (int n) {
int num = 0;
//Iterative computation
for ( i = 1 ; i <= n; i++ ) {
num = num + i;
}
return num;
}
```

Recursive approach (function):

```
int sum (int n) {
if ( n <= 0) {
return 0;
} else {
/* Recursive call */
return n + sum (n-1); //sum calls itself
}
}
```

Program List:

Part A: Write a program (Iterative and Recursive) in C++/Java to:

1. Find the factorial of N.
2. Find sum of digits of a number.
3. Reverse a number.
4. Reverse a string.
5. Perform decimal to binary conversion.
6. Generate Fibonacci series, given n.

Part B: Write a program in C++/Java to:

1. Search a given element in an unsorted array with minimum 5 elements and print it's position if element is present.
2. Sort a given array using a sorting technique you are familiar with.