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# Department of Software Engineering

**CS 250: Data Structures and Algorithms**

**Class: BESE-7AB**

**Lab 7: Asymptotic Complexity Analysis**

**CLO4: Investigate and evaluate various algorithms based on accuracy, time complexity, and memory requirements.**

**Date: November 3rd, 2017**

**Time: 9:00 am -12:00pm, 2:00pm – 5:00pm**

# Instructor: Dr. Muhammad Shahzad

# Lab 7: Asymptotic Complexity Analysis

**Introduction**

This lab is based on the analysis of different algorithms.

**Objectives**

Objective of this lab is to make students analyze different algorithms and their asymptotic complexities.

**Tools/Software Requirement**

Visual Studio 2012 or gcc or g++

**Description**

In computational complexity theory, **asymptotic computational complexity** is the usage of the asymptotic analysis for the estimation of computational complexity of algorithms and computational problems, commonly associated with the usage of big O notation (courtesy: Wikipedia).

**Lab Task**

You are required to upload the lab tasks on LMS and the name of that tasks must be in this format YourFullName\_reg#\_task#.cpp

Remember to comment your code properly. Inappropriate or no comment will results in deduction of marks.

**Task 1**

**Singly Linked List – Unsorted**

* Write algorithm for the following operations & find the asymptotic complexity of each
  + Add Element
    - At head, at tail & in middle
  + Remove element
    - At head, at tail & from middle
  + Finding an element

**Task 2**

**Doubly Linked List – Sorted**

* Write algorithm for the following operations & find the asymptotic complexity of each
  + Add Element
    - At head, at tail & in middle
  + Remove element
    - At head, at tail & from middle
  + Finding an element

**Task 3**

**Array Based Stack**

* Write algorithm for the following operations & find the asymptotic complexity of each
  + Push
  + Pop
  + Peek
  + IsEmpty
  + IsFull

**Task 4**

**Doubly Linked List Based Queue**

* Write algorithm for the following operations & find the asymptotic complexity of each
  + Enqueue
  + Dequeue
  + IsEmpty
  + IsFull
  + FirstElement

**Deliverable**

You are required to upload the lab tasks on LMS before the end of the lab.