

# CS 6380: Distributed Computing

## Section 001

### Project 1

Instructor: Neeraj Mittal

Assigned on: Wednesday, January 31, 2018

Due date: Wednesday, February 28, 2018

You can work on this programming project either individually or in a group. A group can contain up to three students. *Code sharing among group is strictly prohibited and will result in disciplinary action being taken.*

You can do this project in C, C++ or Java. Each student is expected to demonstrate the operation of this project to the instructor or the TA. Since the project involves socket programming, you can only use machines `dcXX.utdallas.edu`, where  $XX \in \{01, 02, \dots, 45\}$ , for running the program. Although you may develop the project on any platform, the demonstration has to be on `dcXX` machines; otherwise, you will be assessed a penalty of 20%.

## 1 Project Description

This project consists of four parts: (a) build a message-passing synchronous distributed system in which nodes are arranged in a certain topology (given in a configuration file), (b) implement Peleg's leader election algorithm to elect a leader, (c) build a breadth first search (BFS) spanning tree rooted at the leader, and (d) use the BFS tree to find the maximum degree of any node in the *BFS tree* (not the network).

You can assume that all links are bidirectional. You will need to use a synchronizer to simulate a synchronous system. Details of a simple synchronizer will be discussed in the class.

**Output:** Each node should print the following to the screen when appropriate: (i) UIDs of its parent and children nodes in the BFS tree, and (ii) its degree in the BFS tree. In addition, the leader also prints the maximum degree of any node in the BFS tree.

## 2 Submission Information

All the submission will be through eLearning. Submit all the source files necessary to compile the program and run it. Also, submit a README file that contains instructions to compile and run your program.

## 3 Sample Configuration File

#

```

# Configuration file for CS 6380 Project 1 (Spring 2018)
#
# As per the "shell" convention, anything following a hash sign is
# a comment and should be ignored by the parser.
#

# Number of nodes
5

# Here we list the individual nodes
#
# Format is:
# UID      Hostname      Port      UIDs of Neighbors
123        dc01          3332      5          23
5          dc33          5678      123        1043
23         dc21          5231      123        1043      89
1043       dc33          2311      5          23          89
89         dc22          3124      23         1043

```