# Department of Computing

**SE312: Software Construction**

**Class: BESE – 5 AB**

# Lab 10: City Search 3

**Date: May 10th , 2017**

**Time: Wednesday (10:00 – 13:00), Wednesday (14:00 – 17:00)**

# Instructor: Fahad Ahmed Satti

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# Lab 10: City Search 3

## Introduction

In this lab, you will extend your lab 5 & 6, to allow the user to search any number of cities near a point, distance between two cities (which is not a straight line), and cities near another city using a Document Oriented NoSQL db. You must clearly model the cities, countries, and location from the GeoCityLite file and store everything as a document.

## Objectives

After performing this lab students will be able to understand:

* NoSQL

## Tools/Software Requirement

* Solutions should be made using Java and must use a Document Oriented DB.
* You can take help from internet but remember **no plagiarism.**

**Description**

Extend your own implementation from Lab 5 and 5 and allow the user to search any number of cities near a point or another city, and be able to find out the distance between any two specific cities by using “The Great Circle Distance Formula”.

Latitude defines how far north or south of the equator a point is positioned.  Points alongside the equator have latitudes of zero. The North Pole has positive (north) latitude of 90, and the South Pole negative (south) latitude of -90. Accordingly, northern-hemisphere locations have positive latitude, and southern-hemisphere locations have negative latitude. Longitude describes how far east a point is, from the prime meridian: an arbitrary line on the earth surface running from pole to pole.

Latitudes are values in the range [-90, 90]. Longitudes are values in the range (-180, 180]. These values are sometimes expressed in degrees, minutes, and seconds, rather than degrees and decimals.  If you’re planning to do calculations, convert the minutes and seconds to decimals first.

The user can provide either lat/long or a city name (reverse search the lat/long), which will be utilized to look for a certain number (based on user input) of nearby cities. Remember, since the earth is not flat, you cannot apply simple arithmetic operations to find out the nearby cities, instead use the “The Great Circle Distance Formula” to find out the nearby lat/long.

You are encouraged to do some research on the internet about “The Great Circle Distance Formula” to find out how to do this task.

**Lab Task**

Your task will be to implement the following:

1. Extend your own implementation from lab 5 and 6. If you haven’t done any of these labs, now is a good time to start.
2. Configure a local Document Oriented NoSQL DBMS.
3. Load data as documents in the NoSQL DB.
4. Search the DB and apply appropriate functions to allow searching of the user specified number of cities near a provided coordinate.
5. Search the DB and apply appropriate functions to allow searching of the user specified number of cities near another city.
6. Search the DB and apply appropriate functions to allow calculation of distance between two specified cities.
7. Using a Version Control System (VCS) to manage your solutions.

## Deliverables

* Each submission is individual with the following composition:
  + Source Code
  + Unit Tests
  + Documentation(Introduction, Approach, Design, How to Run and Analysis)
  + Link to the public repo on GitHub
* Convert your submission files into a zip folder and name it as given below, finally upload the zip folder to LMS.
  + Name – Registration No. – Section

## Grade Criteria

This lab will be graded on the following rubric, with minimum marks 0 and maximum marks of 24:

