# SENG2200/6220 –Programming Languages & Paradigms
# Computer Lab for Week 6, Semester 1, 2020

## Objectives

This lab aims to understand the inheritance of Java/C++ with special issues (i.e. diamond problem). Build the understanding of Java generics and implement toy generic classes as exercises.

## Questions

1. Write a C++ code to demonstrate the diamond problem. Explain the reasons and show a solution to address the problem. (Hint: virtual inheritance).

2. Write a linked list in Java that it uses generics and accepts different types. The linked list provides at least the following methods:
    - insert: add a node in front of the first node.
    - first: return the first node of list.

3. Map is a container to store pairwise data, such that <key,value>. Modifiy the linked list (will be used as the underlying data structure) from Q2 and implement a simple map container which has methods:
    - set: given a pair <key, value>, insert a record in map such that it always inserts a new record at the beginning of the map. It allows duplicate "key".
    - get: given an argument "key", it returns the corresponding "value" of the first occurrence.

   You need to use generics (i.e, key and value could be any object types) and implement the Comparable interface.
   ** Note that map is NOT implemented by using linked list in practice!

4. Write a Staff class to test the map container in Q3. Staff class has an attribute staffID and it will be used to distinguish (compare) two staff. You will need to implement the compareTo method from Comparable interface. Let "user" be a Staff object and "profile" be a String object. The test program should be able to:
    - add a record via set(user, profile);
    - find the value (profile) via get(user).