Seminar 3: Extending the World design
24292-Object Oriented Programming

1 Introduction

The objective of this seminar is to extend the design for countries, continents and worlds from Seminar 2. Concretely, the purpose of the application is to track and manage the ecological status of countries and continents. The new classes designed in this seminar should be connected to the classes from the previous seminar, but to simplify the resulting class diagram you are free to omit some of the previous classes (in particular those related to the shape of regions) as well as their previous attributes and methods.

Part of the solution to these exercises will be implemented in Java during laboratory session 3.

2 Oceans and lakes

Apart from continents, the world also consists of oceans and lakes. Each ocean is adjacent to continents and other oceans. Just like continents, oceans belong to a world. Some lakes are entirely inside a single country, but other lakes may border two or more countries.

3 Species

The application should represent the different species in the world. Some species can only live on land, and some species can only live in water. Moreover, some species are plants, and others are animals.

We also want to represent the feeding pattern of animal species. In particular, some animal species feed on other species (either plants or animals), and this relationship should be modelled by the program. You may assume that land animals can eat any other species, but aquatic animals can only eat aquatic species.

The program should maintain an estimate of the number of instances of each species that exists in the world. It should be possible to compute statistics of the number of instances of each species by country, continent, ocean or lake, or the entire world.

Moreover, each species should be classified according to the total number of instances into one of the following categories:

- Extinct
- Critically endangered
- Endangered
- Vulnerable
- Near-threatened
- Least concern

4 Pollution

Each country has an air quality index which indicates the degree of pollution in the air. Likewise, each ocean and lake has a water quality index which indicates the degree of pollution in the water.

Just as for species, it should be possible to compute statistics of the pollution by country, continent, ocean or lake, or the entire world.