Advanced Programming

Introduction

In this lab, you'll be getting some practice at reading and writing XML and JSON files. The tasks use expanded versions of the library XML and JSON data that was depicted in the lecture. You can download each of these files from moodle.

To use the XML and JSON data files in your eclipse project, you can simply drag-and-drop them into the project folder. Avoid accidentally putting them into the project's src folder or your package. A file located in an eclipse project folder can be accessed using a relative path of, for example, ./filename.xml – which can be thought of as meaning "the file filename.xml located in the current working directory". Eclipse, by default, runs your programs with the project folder as working directory.

Task 1: Understanding the Tree Structure

As we discussed in the lecture, both XML and JSON data can be visualised in a tree structure. It is imperative that you understand this structure properly to be able to successfully write code that can navigate the data. Thus, spend a few minutes sketching out the tree structure of the library data. You can use a pen and paper, drawing software on your computer (e.g. paint), or an online tool (e.g. https://www.draw.io/) The structure is more-or-less the same for both formats, so you only need to do this once. Compare your sketch with some of your classmates on Teams.

Once you have completed your sketch, it should be relatively easy to answer the following questions:

1. What is the parent of the "surname" node?

2. What is the child of the "ISBN" node?

3. What is the grandparent of the "id" node?

Task 2: Parsing the XML Data

Adapt the XML parsing code discussed in the lecture so that it finds the book titled "XML in a Nutshell" in the data file, and lists the book's authors. You can adapt either of the two XML parsing examples discussed in the session, or use a combination of the techniques in both.

You will need to think about how you're going to move through the tree after finding the correct book. Consult your sketch of the tree structure, identify what the correct relationship is between a book's "title" node and its "authors" node, and use the same techniques used earlier in the program to print the author's names.

Task 3: Parsing the JSON Data

Adapt the JSON parsing code discussed in the lecture to do produce the same output as the program you wrote for parsing XML data using the JSON file and the "reference" JSON parser linked to in the lecture slides. You will need to download the jar file containing the JSON reference parser library, which is available here. Once downloaded, the jar file should be dragged-and-dropped into your eclipse project. You will also need to add the jar to your build path, by right clicking on it, selecting "Build Path", and then "Add to Build Path".

There are several alternative JSON parsing libraries available, but you must use the reference parser for all work on the unit. The reference parser is the standard implementation used in a number of programming languages, maximising the transferability of your learning. Be particularly careful if reading online tutorials etc., because they might be using a different library.

Extension Task: Writing Data

This task is fairly straightforward on the JSON side, with some example code given in the lecture. On the XML side, however, its much trickier and involves some independent learning.

Write a program capable of adding a new book to the library JSON file, and one for adding a new book for the XML file. You'll need to use knowledge from last week's lab on I/O and streams, your knowledge of the data structure tree, and the official documentation for the JSON parser (here) and the XML parser (here).