# File Handling

## Overview

In this lab, you will add file-handling capabilities to an existing application, to read/write company and employee data to a file.

## Source modules

Student module: StudentFileHandling

Solution module: SolutionFileHandling

## Roadmap

There are 3 exercises in this lab, of which the last exercise is "if time permits". Here is a brief summary of the tasks you will perform in each exercise; more detailed instructions follow later:

1. Reading/writing data to a text file
2. Serializing objects
3. Reading/writing data to a binary file

## Familiarization with code base

Open the student module, and expand the student.filehandling package. This package contains the "application logic" classes for the system.

Take a quick look at the Company and Employee classes. There are no great surprises; these classes are essentially the same as in an earlier lab. Now take a look at the Main class; the main() method is similar to previous labs, but we've added some new methods:

* loadCompany() - This method is complete. It reads company/employee data from a text file, and returns a Company object (with its associated Employee objects). The method delegates the file-reading task to another class named CompanyPersister, which you'll implement in this exercise.
* saveCompany() - This method is complete. It writes a Company object (and its associated Employee objects) to a text file. The method delegates the file-writing task to the CompanyPersister class.
* deserializeCompany() - This method is incomplete. You will implement this method in Exercise 2, to deserialize a Company object (and its associated Employee objects) from a Java serialization file.
* serializeCompany() - This method is incomplete. You will implement this method in Exercise 2, to serialize a Company object (and its associated Employee objects) to a Java serialization file.

Now expand the student.filehandling.persistence package. This package contains the "persistence logic" classes/interfaces for the system:

* PersistableToTextFile<T> - This is a generic interface. It specifies 2 methods, relating to reading and writing an object (of some type T) to a text file. (Remember, BufferedReader and BufferedWriter are used for text I/O in Java).
* EmployeePersister - Implements PersistableToTextFile<Employee>, to read/write an Employee to a text file. You will implement this class in this exercise.
* CompanyPersister - Implements PersistableToTextFile<Company>, to read/write a Company to a text file. You will implement this class in this exercise.

## Exercise 1: Reading/writing data to a text file

Time to write some code!

* In EmployeePersister, write the readFromTextFile() and writeToTextFile() methods as per the comments in the code, to read/write an Employee to a text file.
* In CompanyPersister, write the readFromTextFile() and writeToTextFile() methods as per the comments in the code, to read/write a Company to a text file.

Back in main(), uncomment the statements to load/save data at application start-up and shut-down. Run the application, and verify that it successfully loads and saves data to a text file.

## Exercise 2: Serialization

Enhance the Employee and Company classes, so that they are serializable. Then add code in Main.java, to implement the deserializeCompany() and serializeCompany() methods.

In main(), uncomment the statements to deserialize/serialize data at application start-up and shut-down. Run the application, and verify that it successfully deserializes and serializes data to a Java serialization file.

## Exercise 3 (If time permits): Reading/writing data to a binary file

In the student.filehandling.persistence package, define a new interface named PersistableToBinFile<T>. Define two methods in the interface:

* readFromBinFile() - Takes a BufferedInputStream object as a parameter, representing a binary input stream. Returns a T, i.e. an object read in from the stream.
* writeToBinFile() - Takes two parameters: a BufferedOutputStream representing a binary output stream, and a T representing the object to write out.

Enhance the CompanyPersister and EmployeePersister classes, so that they implement your new interface. In other words, add binary file I/O support to these two classes.

Finally, enhance Main.java so that it allows the user to load/save binary data (hint: write methods similar to loadCompany() and saveCompany(), to set up BufferedInputStream and BufferedOutputStream objects for binary I/O). Call these new methods from main() at application start-up and shut-down.