

Assignment 5 -Final

Due date

- ~~11:59 PM EST, December 13th.~~ Noon on December 15th.

Submit your code as per the provided instructions. A signup sheet will be provided to you during class to setup an appointment with the TA to provide a demo of your project.

Updates

- Removed the requirement to report the performance of your code.
- 2 Sample input files have been posted.
- Due date has been changed
- Removed requirement for NUM_ITERATIONS, as there is no performance component in this assignment.

Assignment Goal

Comparing Objects in Java.

- You are required to use ANT for the following:
 - Compiling the code
 - running the code
 - Generating a tarball for submission
- Your code should compile and run on *remote.cs.binghamton.edu* or *bingsons* or the *debian-pods* in the Computer Science lab in the Engineering Building.

Project Description

Java Reflection and Object Comparison in Java

- Project requirements:
 - Review the sample input file below to determine the data members and design a Java class, First, in the following way:
 - private data members
 - `int IntValue;`
 - `String StringValue;`
 - `.. // similarly for other data members`
 - empty constructor
 - define the public method `void setIntValue(int iIn) { ... }`
 - define the public method `void setStringValue(String sIn) { ... }`
 - `.. // similarly for other data members`
 - Review the sample input file below to determine the data members and design a Java class, Second, in the following way:
 - data members
 - `double DoubleValue;`

- `int IntValue;`
 - ... // similarly for the other data members
- empty constructor
- define the public method `void setIntValue(int iIn) { ... }`
- define the public method `void setDoubleValue(double dIn) { ... }`
- ... // similarly for the other data members
- Define a class `PopulateObjects` that has data structures (as data members) to store instances of *First* and *Second*. Choose the data structure(s) that are efficient to determine the total number of non-duplicate object instances, and the total number of object instances (includes duplicates).
- `PopulateObjects` should have a method `deserObjects(...)` to read data member values from an `inputFile` and accordingly create instances of `First` and `Second`. Decide the appropriate return value and parameters for the method `deserObjects`
- In `First` and `Second`, override `equals` and `hashCode`, with annotation, appropriately.
- You can design additional methods in `PopulateObjects` as needed.
- The class `FileProcessor` should be used to read one line at a time from the file.
- The input file will have data in the following format (note that the order of first and second is random. So, you have to read the `fqn` value to determine if what follows is a serialized format of first or second

```
fqn:genericDeser.util.First
type=int, var=IntValue, value=17
type=float, var=FloatValue, value=19.3
type=short, var=ShortValue, value=9
type=String, var=StringValue, value=abc
fqn:genericDeser.util.Second
type=int, var=IntValue, value=19
type=double, var=DoubleValue, value=3.14
type=boolean, var=BooleanValue, value=false
fqn:genericDeser.util.Second
type=int, var=IntValue, value=199
type=double, var=DoubleValue, value=33.14
type=boolean, var=BooleanValue, value=false
fqn:genericDeser.util.First
type=int, var=IntValue, value=177
type=float, var=FloatValue, value=199.3
type=short, var=ShortValue, value=99
type=String, var=StringValue, value=cbaabc
```

- Use java reflection (`newInstance` method) to create an object using the value given for `fqn`. Please note that `fqn` is an abbreviation for *Fully Qualified Class Name*.
- Here is an example of Java reflection code to create an object from given `fqn` value. This code then shows how to invoke a method.

```
String clsName = "genericDeser.util.First";           // generalize
Class cls = Class.forName(clsName);
Class[] signature = new Class[1];
signature[0] = Integer.TYPE;                          // generalize
String methdName = "set" + "IntValue";               // generalize
Method meth = cls.getMethod(methodName, signature);
Object obj = cls.newInstance();
Object[] params = new Object[1];
params[0] = new Integer(17);                          // generalize
Object result = meth.invoke(obj, params);
```

- Populate the data structures with instances of `First` and `Second`.
- Read the following [link](#) about boxed primitives, `Integer.TYPE`, and `Integer.class` in the context of Java reflection.

- Generalize the above code so it works for both First and Second objects. For example, you need to set signature[0] value by looking up a map that returns "Integer.TYPE" for the key "int".
- Populate the data structure in PopulateObjects class with the instances of First and Second that are read from the file.
- Design and implement methods in the PopulateObjects class to return the number of non-duplicate instances of First and Second.
- Design and implement methods in the PopulateObjects class to return the total number of instances of First and Second.
- The Driver code should call the PopulateObjects class to populate the data structures and print output on the number of objects.
- So, your final output will be 4 lines:

```
Number of unique First objects: 17
Total Number of First objects: 29
Number of unique Second objects: 19
Total Number of Second objects: 31
```

- The following should be read from command line (in this order): input file name, ~~the value of NUM_ITERATIONS~~, and DEBUG_VALUE. The input file should be read from the same folder as "build.xml".
- Your code should work when run in the following way. So, do NOT use hardcoded arguments in the build.xml file.

```
ant run -Darg0=input.txt -Darg1=iterations -Darg1=0
```

- Use the Logger class from the previous assignment along with your own debug scheme. The DEBUG_VALUE=0 should be reserved for just printing the ~~5~~ 4 output lines shown above.

Sample Inputs

- First sample
 - [Input](#), [Output](#), and [InputGenerator.java](#). [Thanks, Deepak]
- Another Input
 - [Input-2](#) and [Output](#). [Caution: Very large input file] [Thanks, Parshant].

Design Requirements

- Same as previous assignments, except that javadoc is now optional.

Code Organization

- Your directory structure should be the following:

```
lastName_firstName_assign5
---genericDeser
----- README.txt
----- build.xml
----- input.txt
----- src
-----genericDeser
-----driver
-----Driver
-----util
-----First.java
-----Second.java
-----PopulateObjects.java
```

```
-----fileOperations
-----FileProcessor.java
-----other packages that you need
[package and class(es) to use reflection to create objects
```

Code Templates

- None provided for this assignment.

Submission

- Same as Assignment-1.

Late Submissions

- The policy for late submissions is that you will lose 10% of the grade for each day that your submission is delayed.

Grading Guidelines

[Grading Guidelines](#).

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