Code Inspection

for

Taxi Management System

Version 1.0 - 05/01/2016

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Summary

Assigned Classes

The Assigned Class is the Abstract Class “Model”, which location is:

appserver/persistence/cmp/model/src/main/java/com/sun/jdo/api/persistence/model/Model.java

The Assigned Methods of this Class are:

getMappingClass(String className , ClassLoader classLoader)

storeMappingClass(MappingClassElement mappingClass , OutputStream stream)

isPersistenceCapableAllowed(String className)

convertToPersistenceCapable(String className , boolean flag)

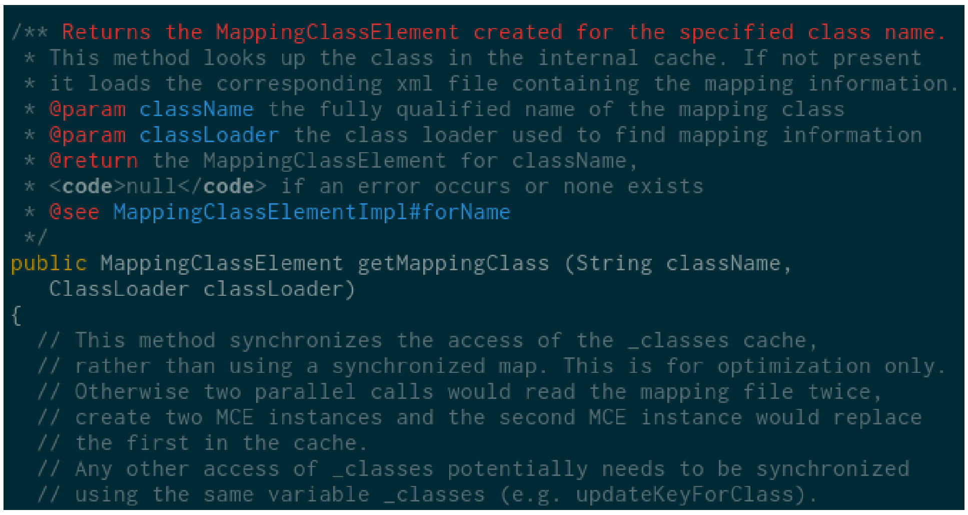
Functional role of assigned set of classes

From the package name of the class assigned for the code inspection task, it is possible to understand that it is part of the Java Data Objects implementation inside the Glassfish Server project. The Java Data Objects (**JDO**) is a specification of java object persistence. The main difference between JDO and the standard JPA implementation of objects is the transparency of the persistence services to the domain model: in JDO persistent objects are ordinary Java classes, so there is no need for them to implement specific interfaces or extend from special classes.

In Java, variables (including fields of classes) have types. Types are either primitive types or reference types. Reference types are either classes or interfaces. Arrays are treated as classes. An object is an instance of a specific class, determined when the instance is constructed. Instances may be assigned to variables if they are assignment compatible with the variable type. The JDO Object Model distinguishes between two kinds of classes: those that are marked as persistence-capable and those that are not. A user-defined class can be persistence-capable unless its state depends on the state of inaccessible or remote objects (e.g. it extends java.net.SocketImpl or uses JNI (native calls) to implement java.net.SocketOptions). A non-static inner class cannot be persistence-capable because the state of its instances depends on the state of their enclosing instances.

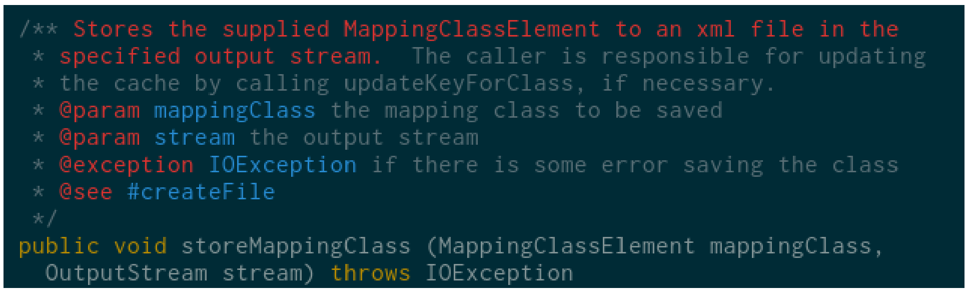
Except for system-defined classes specially addressed by the JDO specification, system-defined classes (those defined in java.lang, java.io, java.util, java.net, etc.) are not persistence-capable, nor is a system-defined class allowed to be the type of a persistent field.

The Model abstract class is contained in the package *com.sun.jdo.api.persistence.model* and defines the backend for the JDO. First of all this class defines caches where the classes will be stored, implemented as static array lists. It defines methods to get and store classes inside these caches, to check if classes or subclasses are already stored and to see if a class is persistence capable. Documentation at the beginning of each methods is very helpful to understand the functionality of each block of code. The access to the cache is synchronized, otherwise to simultaneous calls to the cache would read the mapping class twice and so generate *MappingClassElement* instances, the second replacing the first in the cache.



```
/** Returns the MappingClassElement created for the specified class name.
 * This method looks up the class in the internal cache. If not present
 * it loads the corresponding xml file containing the mapping information.
 * @param className the fully qualified name of the mapping class
 * @param classLoader the class loader used to find mapping information
 * @return the MappingClassElement for className,
 * <code>null</code> if an error occurs or none exists
 * @see MappingClassElementImpl#forName
 */
public MappingClassElement getMappingClass (String className,
   ClassLoader classLoader)
{
  // This method synchronizes the access of the _classes cache,
  // rather than using a synchronized map. This is for optimization only.
  // Otherwise two parallel calls would read the mapping file twice,
  // create two MCE instances and the second MCE instance would replace
  // the first in the cache.
  // Any other access of _classes potentially needs to be synchronized
  // using the same variable _classes (e.g. updateKeyForClass).
```

The method *getMappingClass(String className, ClassLoader classLoader)* assigned in the inspection looks up for the class in the internal cache, and if not present, it will load the corresponding xml file containing the mapping informations using an xmlInputStream, which is closed right after the read call. In the case that the class is not in the internal cache and there is no xml file with information, the class will be added to the set of classes known to be non-Persistence Capable. All possible exceptions are handled with two consecutive catch blocks.



```
/** Stores the supplied MappingClassElement to an xml file in the
 * specified output stream.  The caller is responsible for updating
 * the cache by calling updateKeyForClass, if necessary.
 * @param mappingClass the mapping class to be saved
 * @param stream the output stream
 * @exception IOException if there is some error saving the class
 * @see #createFile
 */
public void storeMappingClass (MappingClassElement mappingClass,
  OutputStream stream) throws IOException
```

The model provides the method *storeMappingClasses*, which saves classes into a file represented by the output stream, but it is not saved into cache. If the output stream reference is null, the method throws an IOException, and if the file cannot be written, an error message is sent to the Logger. After storing the file, it will close the xmlOutput stream and call *unlockFile*, which will unlock the file after the editing and close the output stream passed as parameter to this method.

```
/** Determines if the specified className represents a legal candidate for
 * becoming a persistence capable class.  A class may not become
 * persistence capable if it is declared as static or abstract, an
 * interface, a subclass of another persistence capable class
 * (either direct or indirect), an exception subclass, or a subclass
 * of ejb, swing, awt, or applet classes.
 * @param className the fully qualified name of the class to be checked
 * @return <code>true</code> if this class name represents a legal
 * candidate for becoming a persistence capable class;
 * <code>false</code> otherwise.
 * @see #getModifiersForClass
 * @see #isInterface
 * @see #findPenultimateSuperclass
 */
public boolean isPersistenceCapableAllowed (String className)
```

Next method, *isPersistenceCapableAllowed* checks if a class, whose name is *className,* represent a candidate for becoming a Persistence Capable class. The javadoc of this method contains the rules for a class in order to be considered non-PC:

- Static or abstract
- Interface
- A subclass of another persistence capable class
- An exception subclass
- A subclass of ejb, swing, awt
- Applet classes

```
/** Converts the class with the supplied name to or from persistence
 * capable depending on the flag.
 * @param className the fully qualified name of the class
 * @param flag if <code>true</code>, convert this class to be
 * persistence capable, if <code>false</code>, convert this class
 * to be non-persistence capable
 * @exception IOException if there is some error converting the class
 */
public void convertToPersistenceCapable (String className,
  boolean flag) throws IOException
```

The last class *convertToPersistenceCapable* converts to or from persistence capable, depending on the boolean flag passed as parameter along with the *className.*

If the flag is true, the class is not already persistent and allowed to be PC, it will be converted to Persistence Capable. When the flag is false, information file will be deleted and class removed from cache

Code Issues

Naming conventions

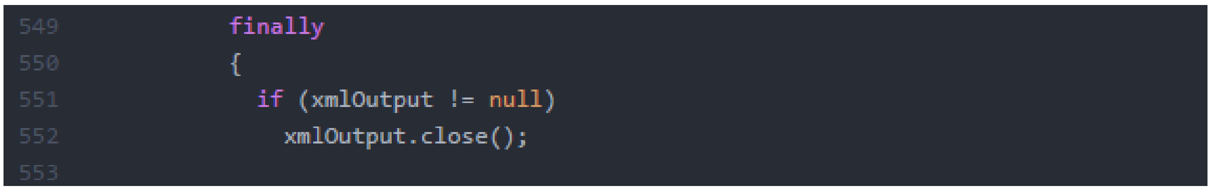
All the Naming Conventions are respected.

Indentation

The code was written using the **"TAB" indentation**. It is better to use two or four spaces, instead, to avoid different interpretations between code editors.

Braces

Allman style is used and respected in the code. However, "if" conditions with a single line code are written **without using curly braces** and this negatively affects the aesthetics of the code.



```
            finally
            {
              if (xmlOutput != null)
                xmlOutput.close();
```

File organization

There are blank lines or comment blocks separating code sections. Code in this class does not exceed 80 characters.

Wrapping lines

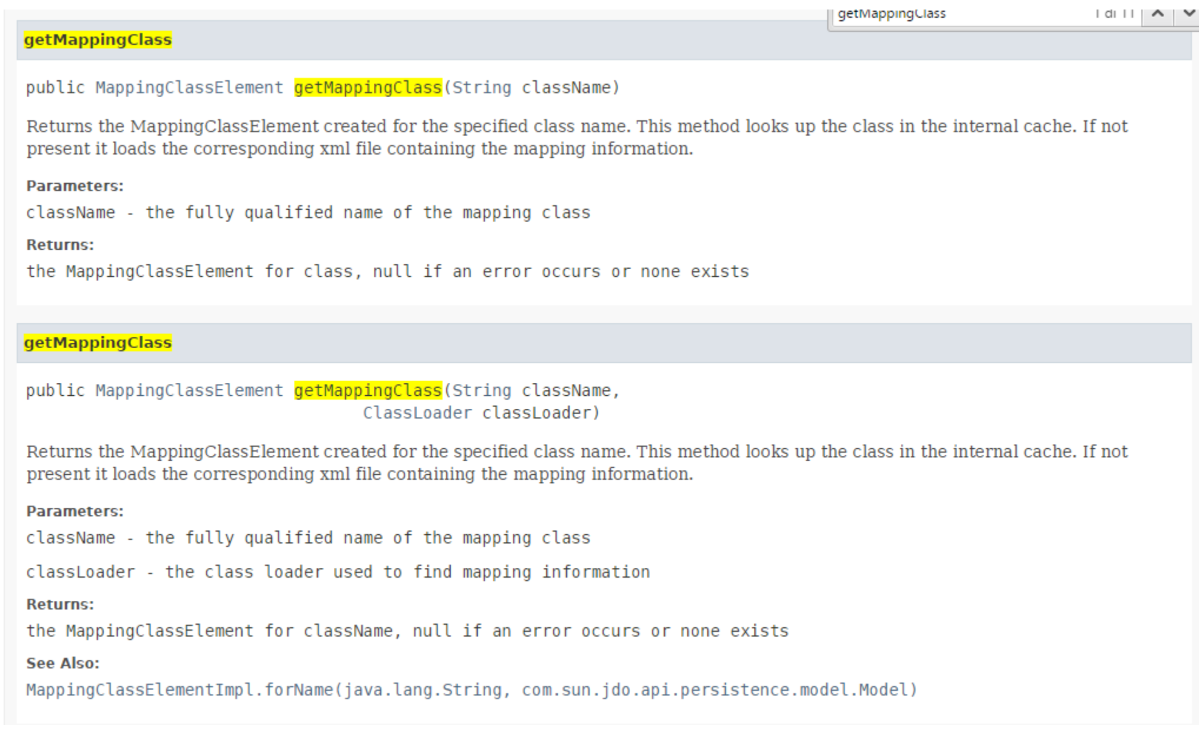
Line break always occur after comma or operator, with a higher-level indentation on the next line.

Comments

Methods are well documented: there are a lot of explaining comments in the code.

Java Source Files

There are no problems regarding the Source Files. Although, in the documentation, it is not clear what is the difference in the "*getMappingClass*" method between passing the *ClassLoader* value or not. Also, in the one without the *ClassLoader* value, it isn't clear what is "*class*", in the returns description.



getMappingClass

```
public MappingClassElement getMappingClass(String className)
```

Returns the MappingClassElement created for the specified class name. This method looks up the class in the internal cache. If not present it loads the corresponding xml file containing the mapping information.

Parameters:
className - the fully qualified name of the mapping class

Returns:
the MappingClassElement for class, null if an error occurs or none exists

getMappingClass

```
public MappingClassElement getMappingClass(String className,
                                           ClassLoader classLoader)
```

Returns the MappingClassElement created for the specified class name. This method looks up the class in the internal cache. If not present it loads the corresponding xml file containing the mapping information.

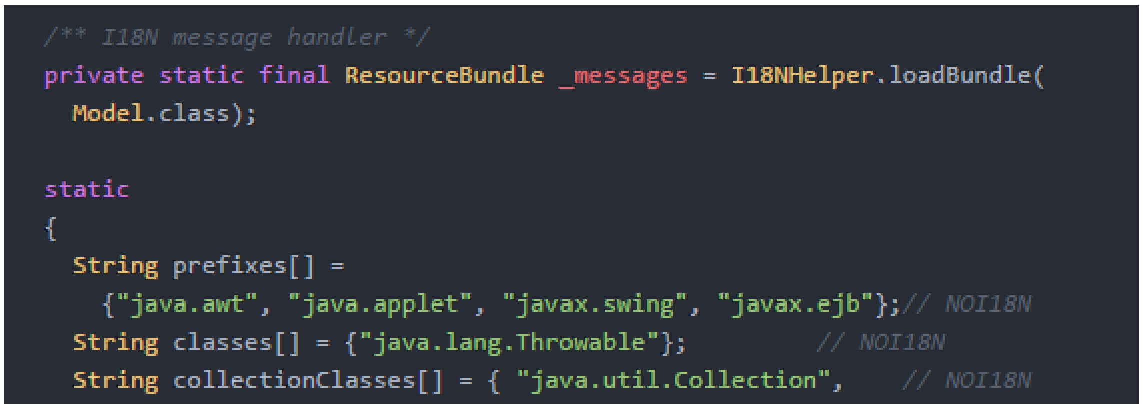
Parameters:
className - the fully qualified name of the mapping class
classLoader - the class loader used to find mapping information

Returns:
the MappingClassElement for className, null if an error occurs or none exists

See Also:
MappingClassElementImpl.forName(java.lang.String, com.sun.jdo.api.persistence.model.Model)

Class and interfaces declarations:

At Line 133 there is a private variable declaration with assignment **before** the package level ones. This is not a real error because the Package level declarations are multiple, so it could be also better to write the single private one before. There are no problems in the assigned methods, though.



```
/** I18N message handler */
private static final ResourceBundle _messages = I18NHelper.loadBundle(
  Model.class);

static
{
  String prefixes[] =
    {"java.awt", "java.applet", "javax.swing", "javax.ejb"};// NOI18N
  String classes[] = {"java.lang.Throwable"};          // NOI18N
  String collectionClasses[] = { "java.util.Collection",     // NOI18N
```

Package and Import Statements

Package and Import Statements lines are correct.

Initialization and declaration:

There are no initialization or declaration problems. Methods are correctly public and variables visibility is correctly assigned.

Arrays

Iterators are used in this code to read the array, so there is no risk to go out of bounds or to make indexing mistakes.

Object comparison:

There are only comparison of the type “== null”, which are correct.

Output format

In this code there isn't log output. Moreover, error messages are handled mostly by throwing exceptions, and exception messages and stack traces are quite accurate.

Computations, Comparisons and Assignments

No brutish programming adopted. Operator precedence and parenthesizing are accurate, sometimes parenthesis are used also for operator precedence problems. There are no arithmetic operations to check. Comparisons and use of boolean values are correct. Error conditions on throw/catch blocks are legitimate and explained in the javadocs. There is no implicit type conversion in the code of the assigned class.

Exceptions

In this code, exceptions are used a lot, in a positive way. All the possible exceptions are caught and other exceptions are correctly thrown by those methods.

Flow of control

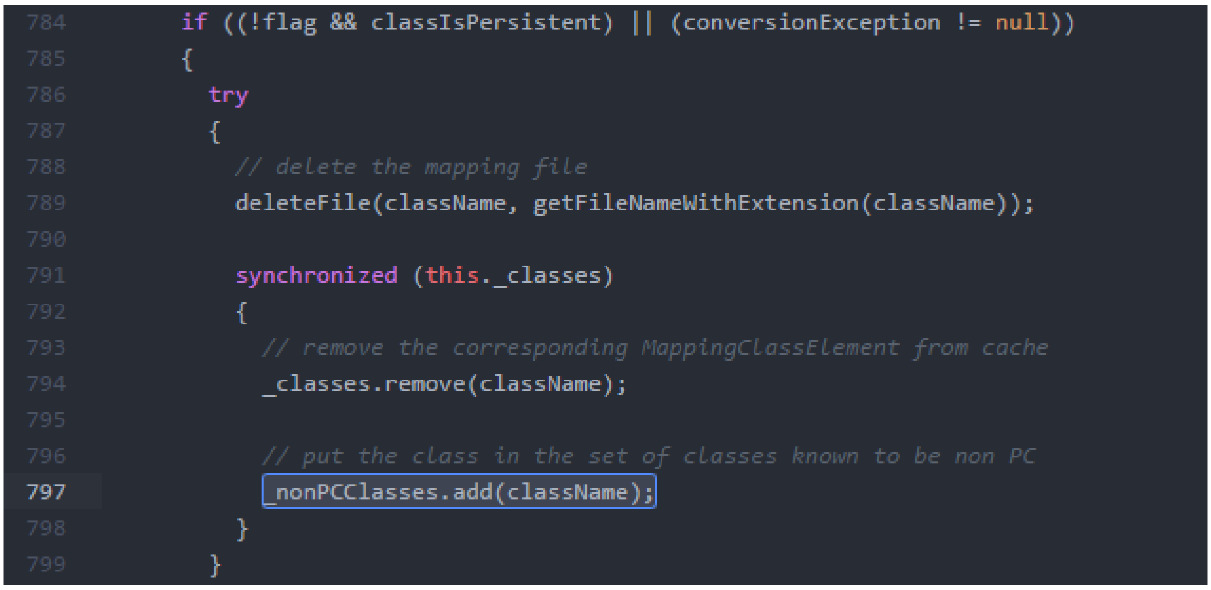
All methods contains only “while” loops with iterators checks, so the flow is handled correctly. There aren’t “switch” commands, too.

Files

All files, input/output streams are opened before use and closed after use or after an error/exception in the catch blocks

Other Code Problems

There aren’t other important problems overall. We will only make a little comment on this part of code:



```
784        if ((!flag && classIsPersistent) || (conversionException != null))
785        {
786          try
787          {
788            // delete the mapping file
789            deleteFile(className, getFileNameWithExtension(className));
790
791            synchronized (this._classes)
792            {
793              // remove the corresponding MappingClassElement from cache
794              _classes.remove(className);
795
796              // put the class in the set of classes known to be non PC
797              _nonPCClasses.add(className);
798            }
799          }
```

First there is a “too general” condition on the if when “conversionException” is compared to null. Of course it works, because whatever it’s the error, we will “backward” the operation, but still we don’t know what is the error in particular, so if for example the error will be thrown at the beginning of the conversion, the backward operation is useless and may generate some errors. It’s rare, but it may happen. Also, the code in row number 797 may generate duplicates because the add method doesn’t check if the class is already in the list. It would have been better to distinguish between Exceptions types and do some other checks to prevent that behavior.

Other than that little thing, we haven’t found errors in the code.

Reference and resources

JPA Implementation:

https://www.eclipse.org/eclipselink/api/2.6/index.html

Java JDO:

https://db.apache.org/jdo/
https://en.wikipedia.org/wiki/Java_Data_Objects https://db.apache.org/jdo/jdo_v_jpa.html
http://svn.apache.org/viewvc/db/jdo/trunk/specification/OOO/JDO-3.1.pdf?view=co

Assignment:

http://glassfish.pompel.me/
http://assignment.pompel.me/