

Java Persistence

Lesson 1: Try Catch Blocks

Catch Error, but program terminates

```
long x = 1;
try {
    x = 1 / 0;
}
catch (ArithmeticException e){
    x = 0;
    System.out.println("Can't divide by zero");
}

System.out.println("This will print. x=" + x);
```

Finally will cause program to continue running

```
long x = 1;
try {
    x = 1 / 0;
}
catch (ArithmeticException e){
    x = 0;
    e.printStackTrace();
}
finally {
    System.out.println("This will print. x=" + x);
}

System.out.println("Life goes on...");
```

Lesson 2: JUnit 4 Implementation

Lesson 2 Plan

- Set up our project for JUnit 4
- Plan our XML methods
- Start writing test methods

JUnit Versions

- Two versions in use are 3 (e.g., 3.8) and 4 (e.g., 4.3)
- We used version 3 in “Total Beginners” tutorial
- We want to start using version 4
- Version 4 is “backward compatible”, so we can start using version 4 and keep (almost) all of our version 3 methods
- Need to re-write our AllTests class

AllTests Class as JUNIT3

```
package org.persistence.tutorial;

import junit.framework.Test;
import junit.framework.TestSuite;

public class AllTests {

    public static Test suite() {
        TestSuite suite = new TestSuite("Test for
org.totalbeginner.tutorial");
        //$JUnit-BEGIN$
        suite.addTestSuite(BookTest.class);
        suite.addTestSuite(PersonTest.class);
        suite.addTestSuite(MyLibraryTest.class);
        //$JUnit-END$
        return suite;
    }

}
```

JUNIT4 conversion w @Java Annotations

```
package org.persistence.tutorial;

import org.junit.runner.*;
import org.junit.runners.*;

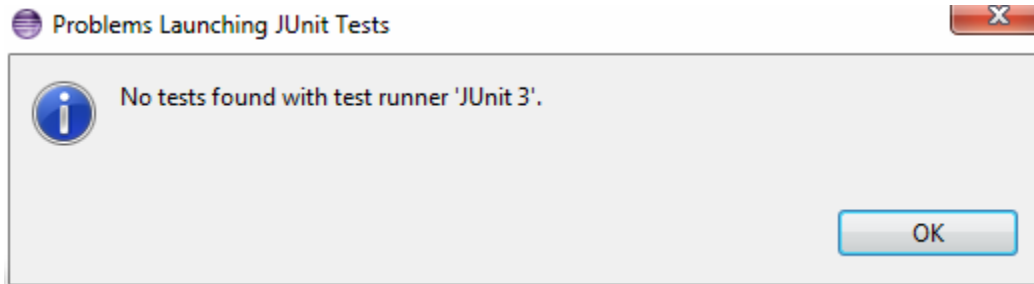
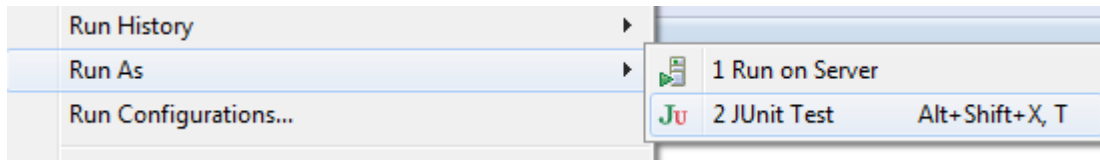
@RunWith(Suite.class)
@Suite.SuiteClasses(value={
    PersonTest.class,
    BookTest.class,
    MyLibraryTest.class
})

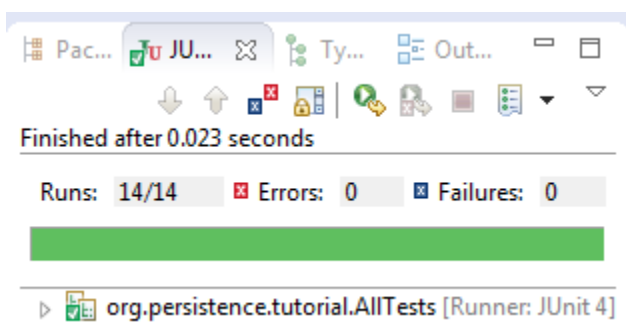
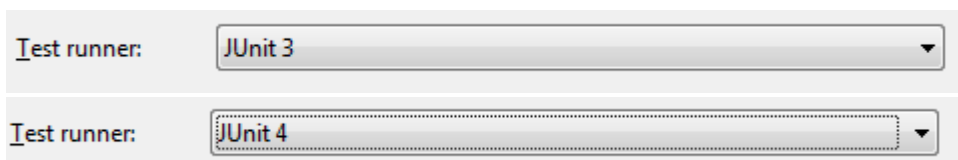
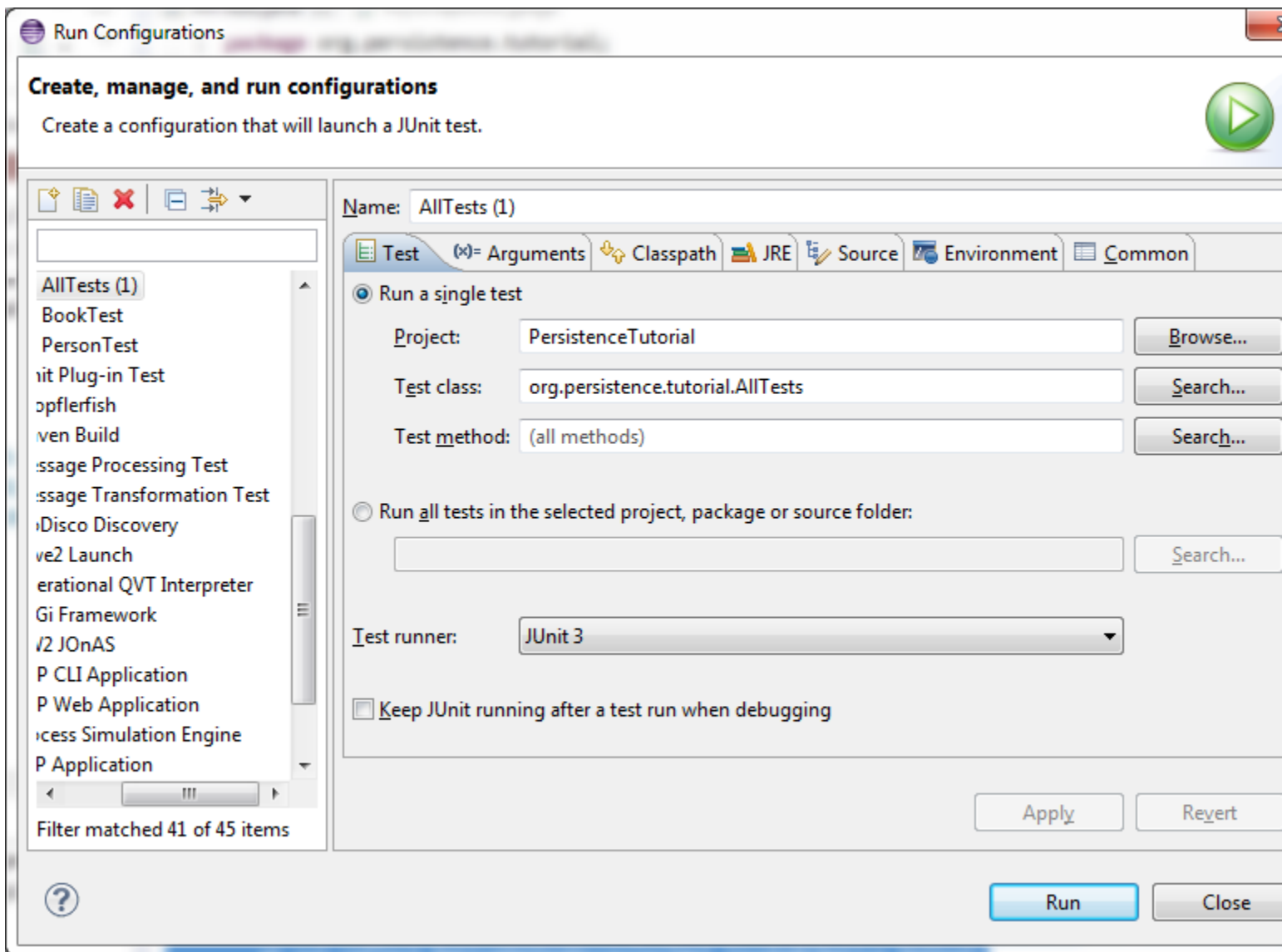
public class AllTests {
```

}

Note: Annotations allow extra info to be added to source code and is checked by the compiler

Running new JUNIT4 syntax after JUNIT3 has been converted. Eclipse still using JUNIT3

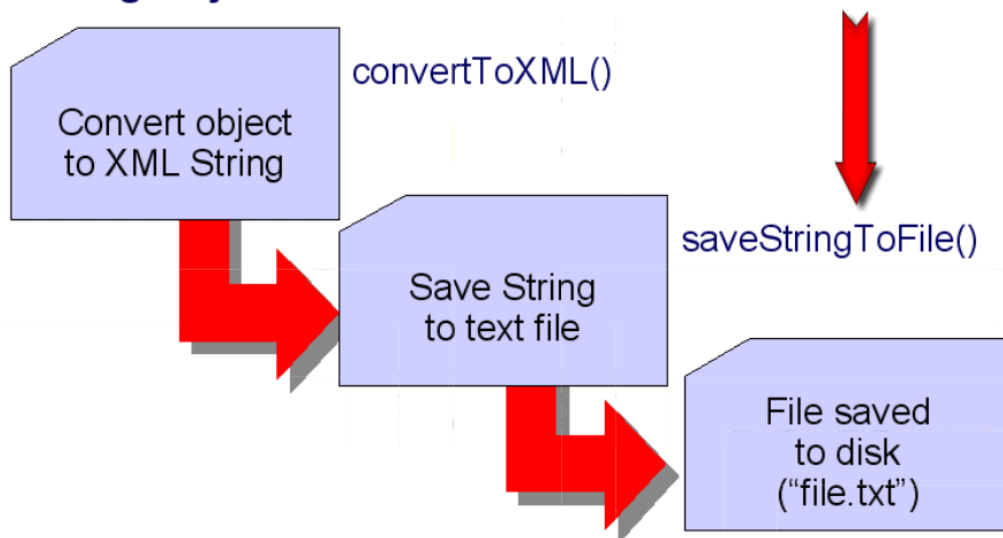




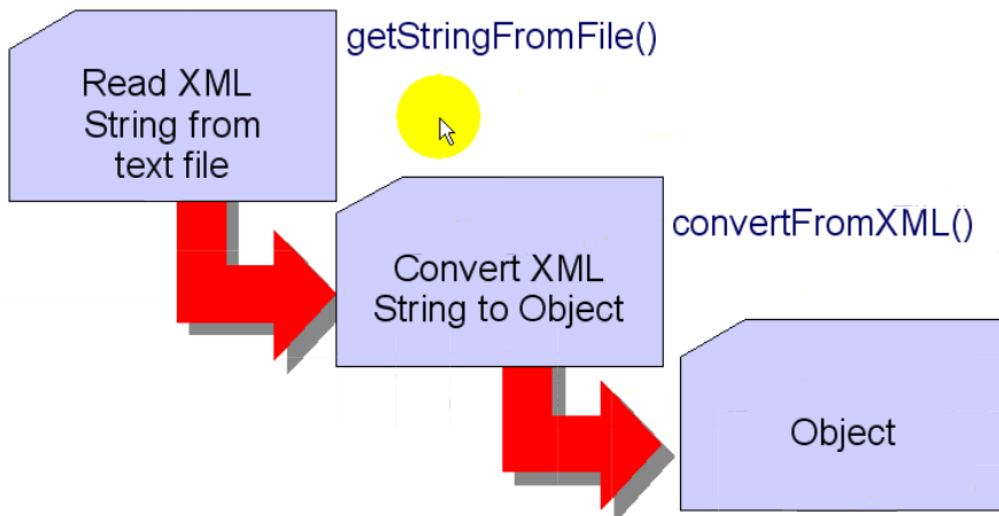
Saving objects to XML Files

Plan

Saving objects to XML files



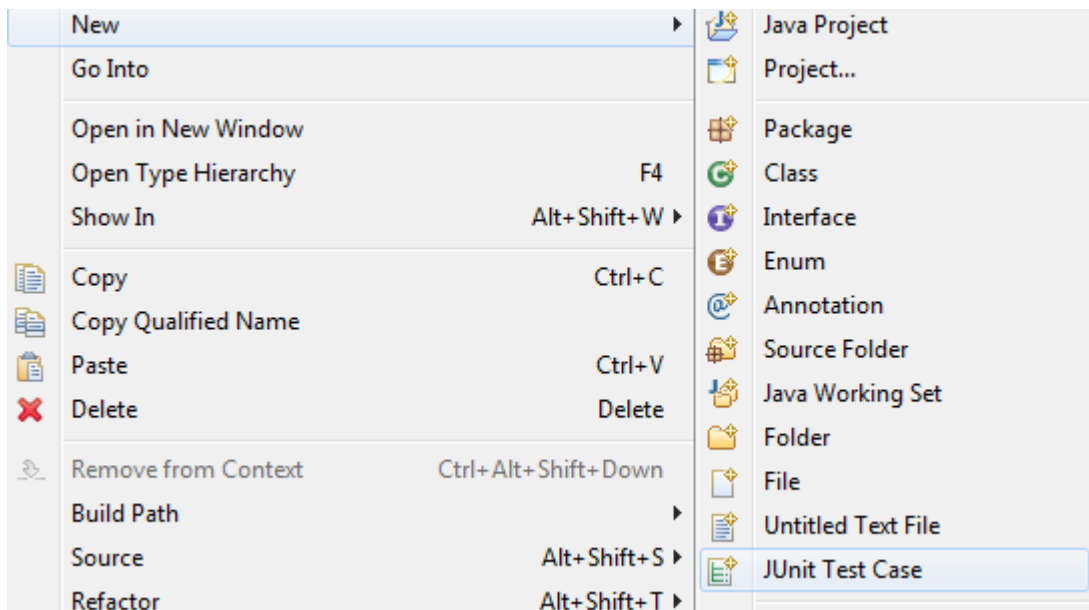
Getting objects from XML files



MyUtilities Class

- Generic methods, not specific to MyLibrary objects
- Create a “helper” utility class called MyUtilities
- Create static methods (like functions in procedural programming languages)
- Static methods don't require an instance of the class to run; they don't depend on any instance variable

Since these procedures are generic, best to make a UtilitiesClass



New JUnit Test Case

Select the name of the new JUnit test case. You have the options to specify the class under test and on the next page, to select methods to be tested.

☐ New JUnit 3 test ☒ New JUnit 4 test

Source folder: PersistenceTutorial/test Browse...

Package: org.persistence.tutorial Browse...

Name: MyUtilitiesTest

Superclass: java.lang.Object Browse...

Which method stubs would you like to create?

☐ setUpBeforeClass() ☐ tearDownAfterClass()
☐ setUp() ☐ tearDown()
☐ constructor

Do you want to add comments? (Configure templates and default value [here](#))
☒ Generate comments

Class under test: Browse...

? < Back Next > Finish Cancel

MyUtilitiesTest.java

- MyUtilitiesTest
 - test(): void

```
package org.persistence.tutorial;

//imports shorten statements
import static org.junit.Assert.*;
import org.junit.Test;

public class MyUtilitiesTest {

    // using @Test allows any name to be used for the method ( instead of
    test*... )
    @Test
    public void saveStringToFile() {

    }

}
```

Lesson 3 File IO Test Cases

Create test class first, then create new class 'MyUtilities'

```
package org.persistance.tutorial;

//imports shorten statements
import static org.junit.Assert.*;

import java.io.File;

import org.junit.Test;

public class MyUtilitiesTest {

    // using @Test allows any name to be used for the method ( instead of
    test*... )
    @Test
    public void saveStringToFile() {
        String saveString = "this is test line 1\n" +
            "this is test line two\n";

        // reading from testfile, strips \n newline
        // when writing to file, need to add back in
        File testFile = new File("testsavetostring.txt");

        // delete previously existing files
        testFile.delete(); // Eclipse automatically adds 'java.io.File'

package
        assertFalse("File should not exist",
            testFile.exists());

        assertTrue("File should have been saved",
            MyUtilities.saveStringToFile("testsavestring.txt",
                saveString));

        String newString = MyUtilities.getStringFromFile(
            "testsavestring.txt");
        assertTrue("Save and get strings should be equal",
            saveString.equals(newString));

        // save string to file, then eval the method result for
        'true'/successful
        assertFalse("File should not be saved", MyUtilities.saveStringToFile(
            "Non-existent directory/thisshouldfail",
            saveString));

        // create empty string, retrieve file contents and ensure still empty
        String emptyString = MyUtilities.getStringFromFile(
            "badfilename.txt");
        assertTrue("String should be empty",
            emptyString.length() == 0 );
    }
}
```


}

```
assertTrue("File should have been saved",  
    MyUtilities.saveStringToFile("testsavestring.tx
```

String n

assertTr

// save

assertFa

// creat

 MyUtilities cannot be resolved

7 quick fixes available:

-  [Create class 'MyUtilities'](#)
-  [Create constant 'MyUtilities'](#)
-  [Create local variable 'MyUtilities'](#)
-  [Change to 'MyUtilitiesTest' \(org.persistence.tutorial\)](#)
-  [Create field 'MyUtilities'](#)
-  [Create parameter 'MyUtilities'](#)
-  [Fix project setup...](#)

Source folder:








PersistenceTutorial/test

Package:

org.persistence.tutorial

Source Folder Selection

Choose a source folder:

- ▷  Characters
- ▷  JavaLib
- ▲  PersistenceTutorial
 - ▷  src
 - ▷  test
- ▷  Strings
- ▷  TotalBeginner

New

Java Class
Create a new Java class.

Source folder: PersistenceTutorial/src Browse...

Package: org.persistence.tutorial Browse...

☐ Enclosing type: org.persistence.tutorial.MyUtilitiesTest Browse...

Name: MyUtilities

Modifiers: ☒ public ☐ default ☐ private ☐ protected
☐ abstract ☐ final ☐ static

Superclass: java.lang.Object Browse...

Interfaces: Add...
Remove

Which method stubs would you like to create?

☐ public static void main(String[] args)
☐ Constructors from superclass
☒ Inherited abstract methods

Do you want to add comments? (Configure templates and default value [here](#))
☐ Generate comments

? Finish Cancel

Creates MyUtilities class

```
package org.persistence.tutorial;

public class MyUtilities {

}
```

```
String newString = MyUtilities.getStringFromFile(
    "testsavestring.txt");
assertTrue("Save and get string equals",
    saveString.equals(newString));

// save string to file, then get it back
assertFalse("File should not be empty",
    saveString.isEmpty());
```

The method getStringFromFile(String) is undefined for the type MyUtilities

1 quick fix available:

- Create method 'getStringFromFile(String)' in type 'MyUtilities'

```
public static String getStringFromFile(String string) {
    public
    (default)
    public
```

Creates methods

```
public static boolean saveStringToFile(String string, String saveString) {
    // TODO Auto-generated method stub
    return false;
}

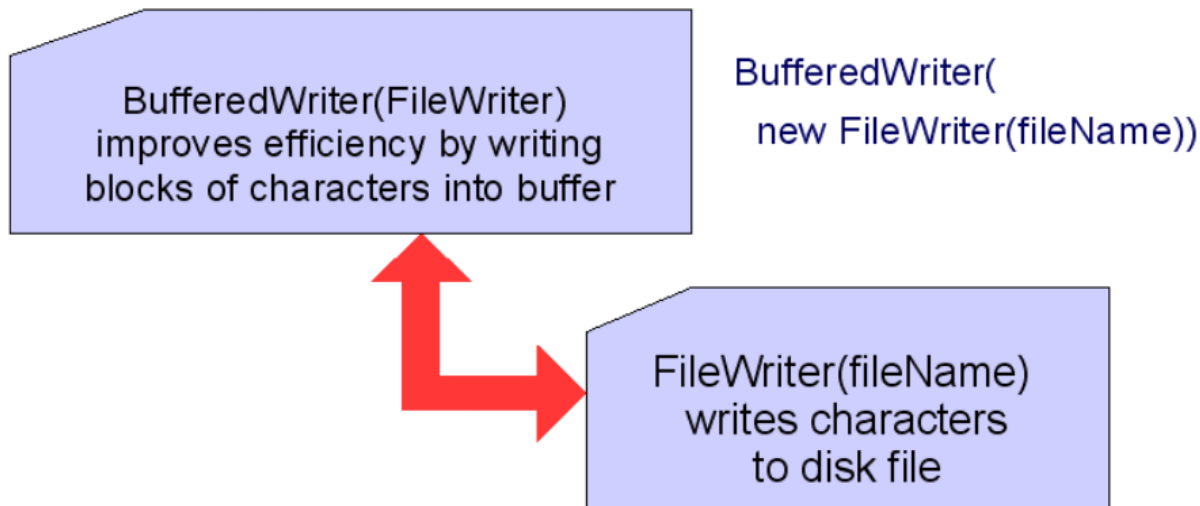
public static String getStringFromFile(String string) {
    // TODO Auto-generated method stub
    return null;
}
```

Lesson 4: Writing Text Files in Java

Filewriter ONLY writes ONE char at a time.

BufferedWriter stores chars up to buffer limit, then writes to file

Writing Text Files in Java



Writing to `BufferWriter`, then use 2 try/catch blocks to check for error conditions

Writing is risky, so push `close()` at the end.

```
public class MyUtilities {
```

```

public static boolean saveStringToFile(String filename,
    String saveString) {
    boolean saved = false;
    BufferedWriter bw = null;
    try{
//      Since we never use the FileWriter directly, can just nest
//      FileWriter fw = new FileWriter(fileName);
//      bw = new BufferedWriter(fw);

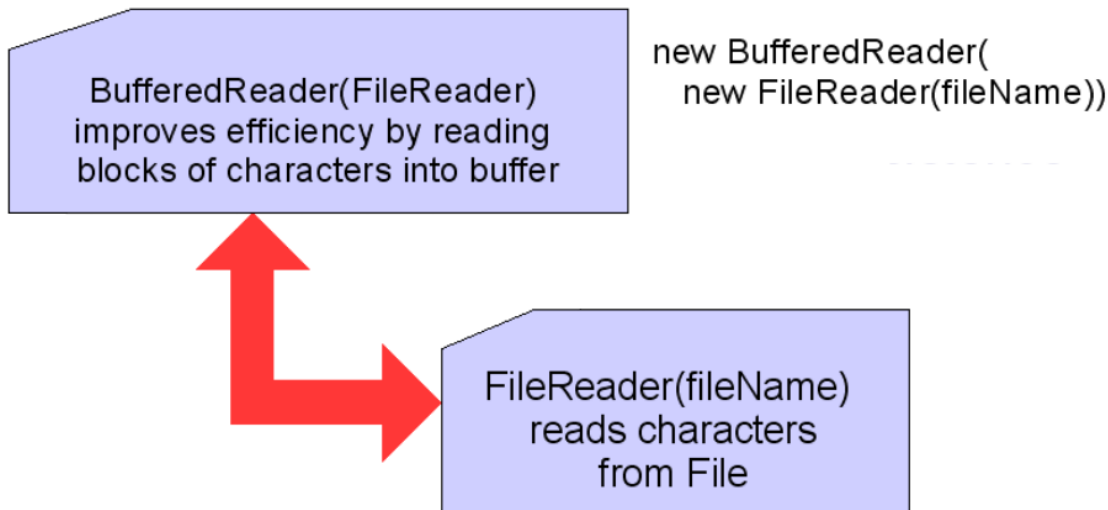
        // create BufferedWriter that contains new FileWriter(filename)
        bw = new BufferedWriter(
            new FileWriter(filename));

        try{
            bw.write(saveString);
            saved = true;
        }
        // guaranteed to run even if error encountered on write
        finally {
            bw.close();
        }
        // no catch needed on inner since the outer catch will catch
anything
        // from this inner try/finally block
    }
    catch ( IOException ex) {
        ex.printStackTrace();
    }
    return saved;
}

```

Lesson 5: Reading from File

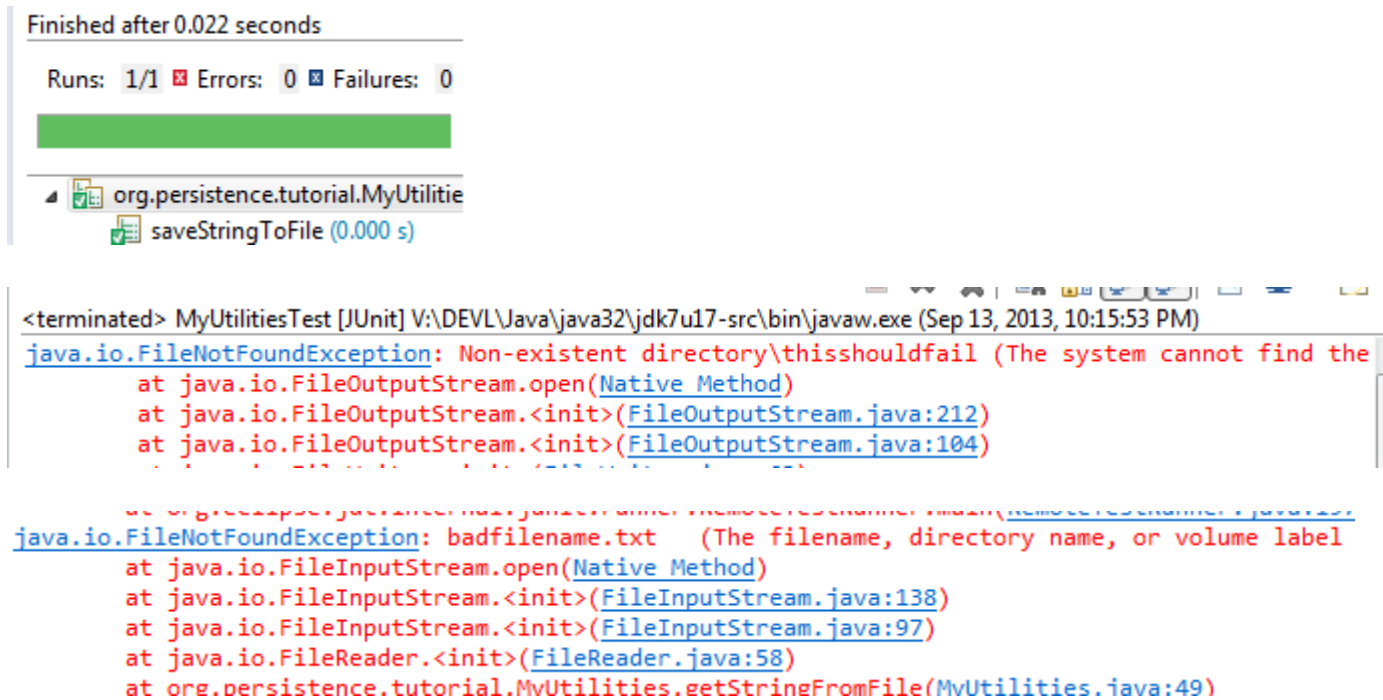
Reading Text Files in Java



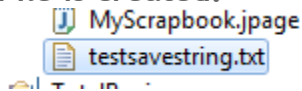
Class code

```
public static String getStringFromFile(String fileName) {  
    BufferedReader br = null;  
    // StringBuilder optimized for adding strings together  
    // much faster for large iterations  
    StringBuilder sb = new StringBuilder();  
  
    try {  
        br = new BufferedReader(  
            new FileReader(fileName));  
        try {  
            String s;  
            // readLine() reads one line at a time ( until \n )  
            // doesn't include the linefeed chars  
            while ((s = br.readLine()) != null){  
                // add linefeed back since stripped by readLine  
                sb.append(s);  
                sb.append("\n");  
            }  
        }  
        // always runs so good place to close file  
        finally {  
            br.close();  
        }  
    }  
    catch (IOException ex) {  
        ex.printStackTrace();  
    }  
    // StringBuilder, not a String so convert to one  
    return sb.toString();  
}
```

Running as JUNIT, test passes, but get IOException

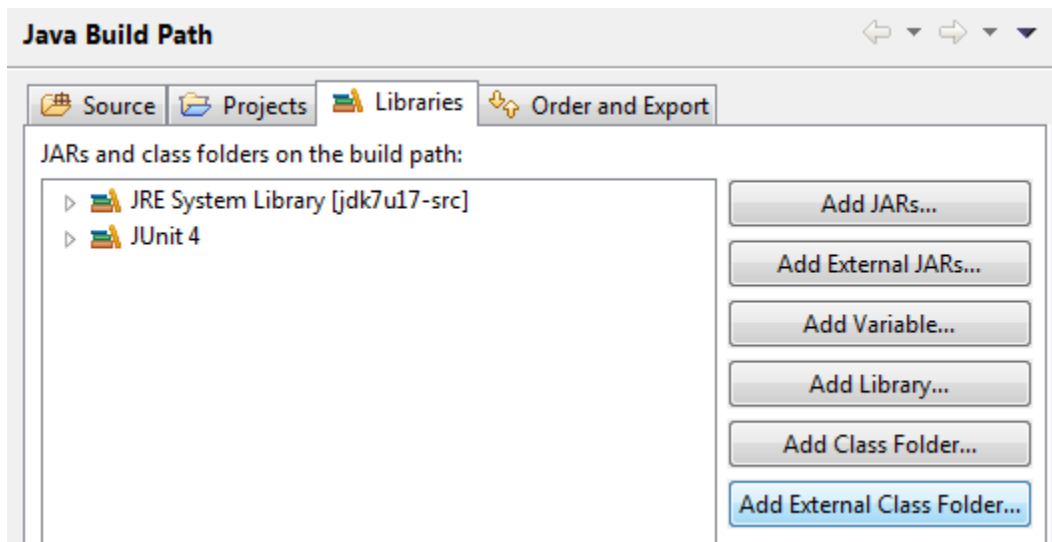


File is created:



```
this is test line 1
this is test line two
```

Lesson 6: Add XStream 3rd party package



Make sure JDK1.7 has javadoc source

- ▲ JRE System Library [jdk7u17-src]
 - Access rules: No rules defined
 - Native library location: (None)
 - ▶ resources.jar - V:\DEV\Java\java32\jdk7u17-src\
 - ▲ rt.jar - V:\DEV\Java\java32\jdk7u17-src\jre\lib
 - Source attachment: src.zip - V:\DEV\Java\jav
 - Javadoc location: <http://download.oracle.com>
 - Native library location: (None)
 - Access rules: (No restrictions) - non modifiab

Lesson 6: Add method to create a MyLibrary with one line of code

```
public MyLibrary createMyLibrary() {  
    // declarations  
    Book b1;  
    Book b2;  
    Person p1;  
    Person p2;  
    MyLibrary ml;  
  
    // instantiate objects  
    b1 = new Book("Book1");  
    b2 = new Book("Book2");  
    p1 = new Person();  
    p1.setName("Fred");  
    p2 = new Person();  
    p2.setName("Sue");  
    ml = new MyLibrary("Test");  
  
    // add books  
    ml.addBook(b1);  
    ml.addBook(b2);  
    ml.addPerson(p1);  
    ml.addPerson(p2);  
    return ml;  
}
```

Lesson 7: Converting To/From XML

```
public static String convertToXML(MyLibrary ml) {  
    // create XStream object to get at the methods  
    XStream xstream = new XStream(new DomDriver());  
    // convert MyLibrary to string  
    return xstream.toXML(ml);  
}  
  
public static MyLibrary convertFromXML(String XMLString) {  
    MyLibrary ml = null;  
    XStream xstream = new XStream(new DomDriver());  
    // xstream doesn't know what XMLString is, so use obj  
    Object obj = xstream.fromXML(XMLString);  
    // Check if the returned object is a 'MyLibrary' object
```

```

        if ( obj instanceof MyLibrary) {
            // case ml as MyLibrary from obj
            ml = (MyLibrary) obj;
        }
        return ml;
    }
}

```

Lesson 8: Save\Read MyLibrary XML object from fileName

```

/*
 * Converts a MyLibrary object to XML and saves to fileName
 */
public static boolean saveMyLibraryToXMLFile(String fileName,
        MyLibrary ml) {
    return saveStringToFile(fileName, convertToXML(ml));
}

/*
 * Gets a MyLibrary XML object from file, then converts
 * to a MyLibrary object
 */
public static MyLibrary getMyLibraryFromXMLFile(String fileName) {
    return convertFromXML(getStringFromFile(fileName));
}

```

Output XML File



```





<myLibrary>
  <name>Test</name>
  <books>
    <book>
      <title>Book1</title>
      <author>unknown author</author>
      <person>
        <name>Fred</name>
        <maximumBooks>3</maximumBooks>
      </person>
    </book>
    <book>
      <title>Book2</title>
      <author>unknown author</author>
    </book>
  </books>
  <people>
    <person reference="../../books/book/person"/>
    <person>
      <name>Sue</name>
      <maximumBooks>3</maximumBooks>
    </person>
  </people>
</myLibrary>

```

Lesson 9: Comparing Files



Finished after 0.305 seconds




Runs: 3/3  Errors: 2  Failure

▲  org.persistence.tutorial.MyUtilitiesTest
  saveStringToFile (0.005 s)
  convertToXML (0.265 s)
  saveToXMLFile (0.018 s)

Adding convertToXML Aliases

```
public static String convertToXML(MyLibrary ml) {  
    // create XStream object to get at the methods  
    XStream xstream = new XStream(new DomDriver());  
  
    // adding alias commands  
    xstream.alias("person", Person.class);  
    xstream.alias("book", Book.class);  
    xstream.alias("mylibrary", MyLibrary.class);  
  
    // convert MyLibrary to string  
    return xstream.toXML(ml);  
}
```

▲  org.persistence.tutorial.MyUtilitiesTest [Runne  Failure Trace

 saveStringToFile (0.005 s)
  convertToXML (0.265 s)
  saveToXMLFile (0.022 s)

```

public static MyLibrary convertFromXML(String XMLString) {
    MyLibrary ml = null;
    XStream xstream = new XStream(new DomDriver());

    // adding alias commands
    xstream.alias("person", Person.class);
    xstream.alias("book", Book.class);
    xstream.alias("mylibrary", MyLibrary.class);

    // xstream doesn't know what XMLString is, so use obj
    Object obj = xstream.fromXML(XMLString);
    // Check if the returned object is a 'MyLibrary' object
    if ( obj instanceof MyLibrary) {
        // case ml as MyLibrary from obj
        ml = (MyLibrary) obj;
    }
    return ml;
}

```

Now XMLfile has aliased objects

XML Output File

```

<mylibrary>
  <name>Test</name>
  <books>
    <book>
      <title>Book1</title>
      <author>unknown author</author>
      <person>
        <name>Fred</name>
        <maximumBooks>3</maximumBooks>
      </person>
    </book>
    <book>
      <title>Book2</title>
      <author>unknown author</author>
    </book>
  </books>
  <people>
    <person reference="../../../books/book/person"/>
    <person>
      <name>Sue</name>
      <maximumBooks>3</maximumBooks>
    </person>
  </people>
</mylibrary>

```

Object Reference Option #2 - Id's

```

public static String convertToXML(MyLibrary ml) {
    // create XStream object to get at the methods
    XStream xstream = new XStream(new DomDriver());
    // tell xstream to add IDs for object references WITH optional aliases
    or 'reference paths'
    xstream.setMode(XStream.ID_REFERENCES);
}

```

```

        // adding alias commands
        xstream.alias("person", Person.class);
        xstream.alias("book", Book.class);
        xstream.alias("mylibrary", MyLibrary.class);

        // convert MyLibrary to string
        return xstream.toXML(ml);
    }

    public static MyLibrary convertFromXML(String XMLString) {
        MyLibrary ml = null;
        XStream xstream = new XStream(new DomDriver());
        // tell xstream to add IDs for object references WITH optional aliases
or 'reference paths'
        xstream.setMode(XStream.ID_REFERENCES);

        // adding alias commands
        xstream.alias("person", Person.class);
        xstream.alias("book", Book.class);
        xstream.alias("mylibrary", MyLibrary.class);

        // xstream doesn't know what XMLString is, so use obj
        Object obj = xstream.fromXML(XMLString);
        // Check if the returned object is a 'MyLibrary' object
        if ( obj instanceof MyLibrary) {
            // case ml as MyLibrary from obj
            ml = (MyLibrary) obj;
        }
        return ml;
    }
}

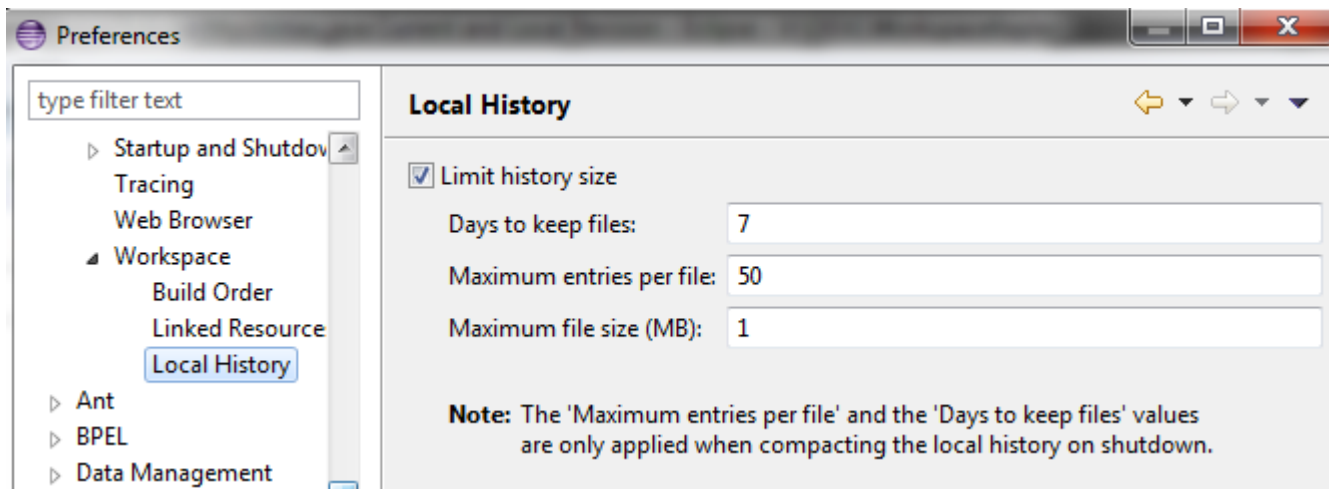
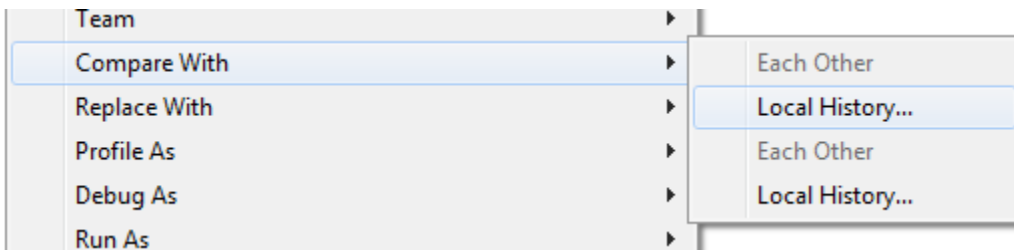
```

```

<mylibrary id="1">
  <name>Test</name>
  <books id="2">
    <book id="3">
      <title>Book1</title>
      <author>unknown author</author>
      <person id="4">
        <name>Fred</name>
        <maximumBooks>3</maximumBooks>
      </person>
    </book>
    <book id="5">
      <title>Book2</title>
      <author>unknown author</author>
    </book>
  </books>
  <people id="6">
    <person reference="4"/>
    <person id="7">
      <name>Sue</name>
      <maximumBooks>3</maximumBooks>
    </person>
  </people>
</mylibrary>

```

Compare with Local History



EGit Installation/Config

<http://www.eclipse.org/egit/download/>

<https://meteo.unican.es/trac/wiki/EclipseDevelopment/SubversionAndGit>

eclipse.buildId=4.3.0.I20130605-2000

java.version=1.6.0_33

java.vendor=Sun Microsystems Inc.

BootLoader constants: OS=win32, ARCH=x86, WS=win32, NL=en_US

Framework arguments: -product org.eclipse.epp.package.standard.product -showlocation

Command-line arguments: -os win32 -ws win32 -arch x86 -product org.eclipse.epp.package.standard.product -showlocation

Warning

Sat Sep 14 00:15:35 CDT 2013

Warning: EGit couldn't detect the installation path "gitPrefix" of native Git. Hence EGit can't respect system level

Git settings which might be configured in \${gitPrefix}/etc/gitconfig under the native Git installation directory.

The most important of these settings is core.autocrlf. Git for Windows by default sets this parameter to true in this system level configuration. The Git installation location can be configured on the

Team > Git > Configuration preference page's 'System Settings' tab.

This warning can be switched off on the Team > Git > Confirmations and Warnings preference page.

type filter text

- Log4E
- Maven
- Model Validation
 - MoDisco
- Mylyn
- OCL
- Papyrus
- PHP
- Plug-in Development
- Process Manager
- Report Design
- Run/Debug
- SCA Tools
- Server
- Team
 - CVS
 - File Content
 - Git
 - Commit Dialog
 - Configuration
 - Confirmations and Warnings
 - History
 - Label Decorations
 - Projects
 - Synchronize
 - Window Cache
 - Ignored Resources

Configuration

← ▾ → ▾ ▾

User Settings System Settings Repository Settings

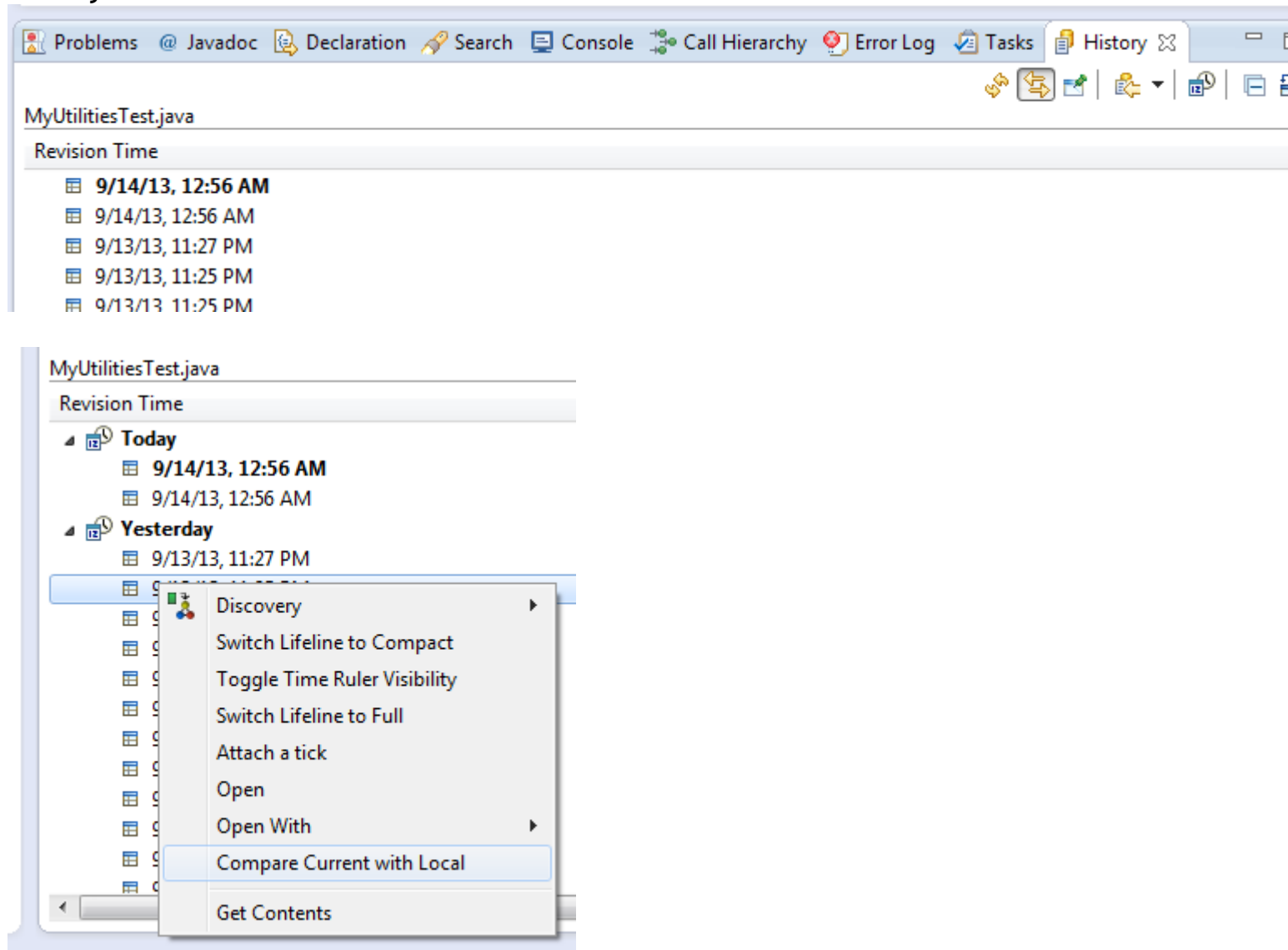
Location: V:\DEVL\Git\GitPortable\etc\gitconfig Browse... Open

Key	Value
color	
branch	auto
diff	auto
interactive	true
status	auto
core	
autocrlf	true
symlinks	false
diff	
astextplain	
textconv	astextplain
help	
format	html
http	
sslCAinfo	/bin/curl-ca-bundle.crt
pack	
packSizeLimit	2g
rebase	
autosquash	true
sendemail	
smtpserver	/bin/msmtp.exe

Add Entry... Remove

Lesson 10: History Main() and Export

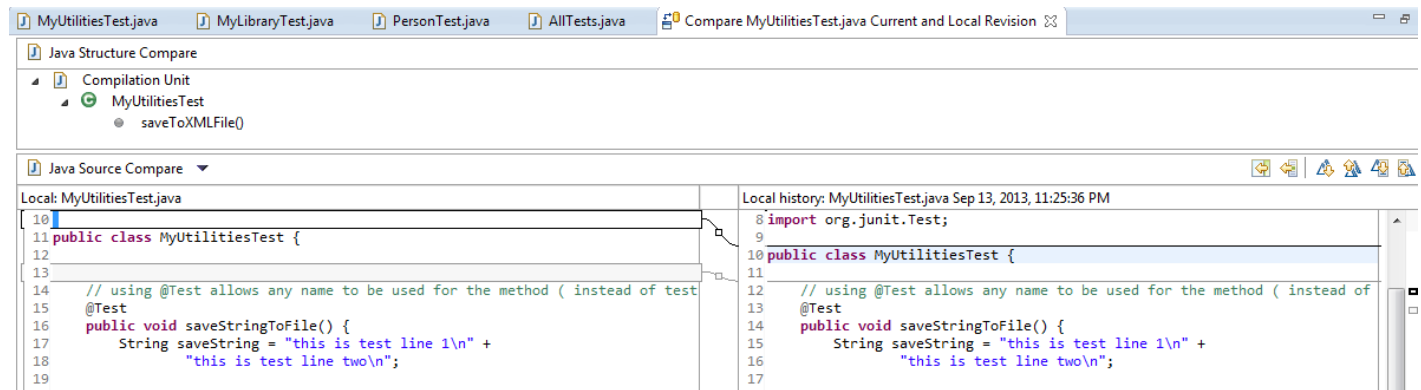
History



The screenshot shows the History view in an IDE. The top toolbar includes buttons for Problems, Javadoc, Declaration, Search, Console, Call Hierarchy, Error Log, Tasks, and History. The History view is titled "MyUtilitiesTest.java" and shows a list of revisions with their timestamps:

- 9/14/13, 12:56 AM
- 9/14/13, 12:56 AM
- 9/13/13, 11:27 PM
- 9/13/13, 11:25 PM
- 9/13/13 11:25 PM

Below the list, there is a section for "MyUtilitiesTest.java" with a "Revision Time" header. It shows a tree view with "Today" and "Yesterday" sections. A context menu is open over the "Yesterday" section, showing options like "Discovery", "Switch Lifeline to Compact", "Toggle Time Ruler Visibility", "Switch Lifeline to Full", "Attach a tick", "Open", "Open With", "Compare Current with Local", and "Get Contents".

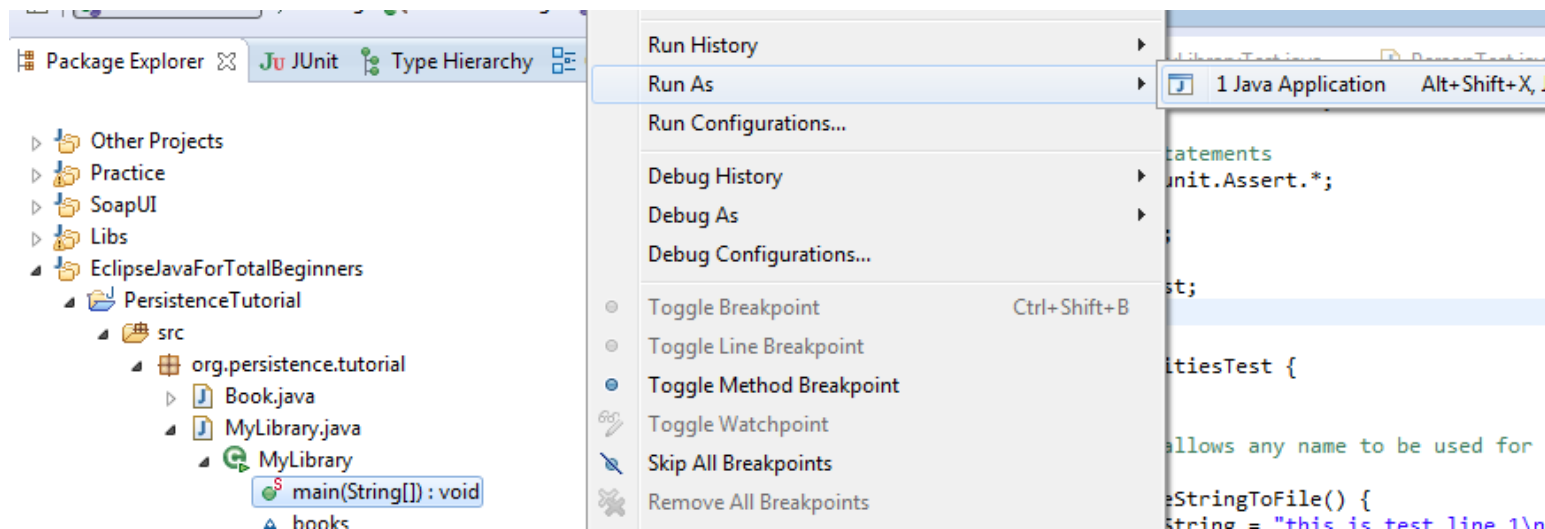


The screenshot shows the Java Source Compare view. The top toolbar includes buttons for Java Structure Compare, Compilation Unit, MyUtilitiesTest, saveToXMLFile(), and Java Source Compare. The view is titled "Compare MyUtilitiesTest.java Current and Local Revision". It shows a comparison between the current version of MyUtilitiesTest.java and a local history revision from Sep 13, 2013, 11:25:36 PM. The code is displayed in two panes, with the left pane showing the current version and the right pane showing the local history version. The code is as follows:

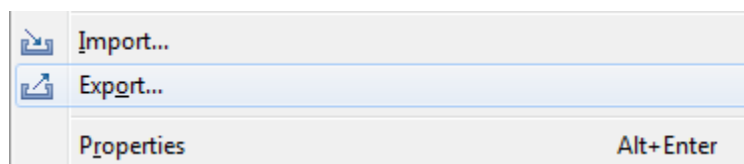
```
Local: MyUtilitiesTest.java
10
11 public class MyUtilitiesTest {
12
13
14 // using @Test allows any name to be used for the method ( instead of test
15 @Test
16 public void saveStringToFile() {
17     String saveString = "this is test line 1\n" +
18         "this is test line two\n";
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```

Note: Presence of the main() method, will produce a 'Java Application' option under 'Run As'



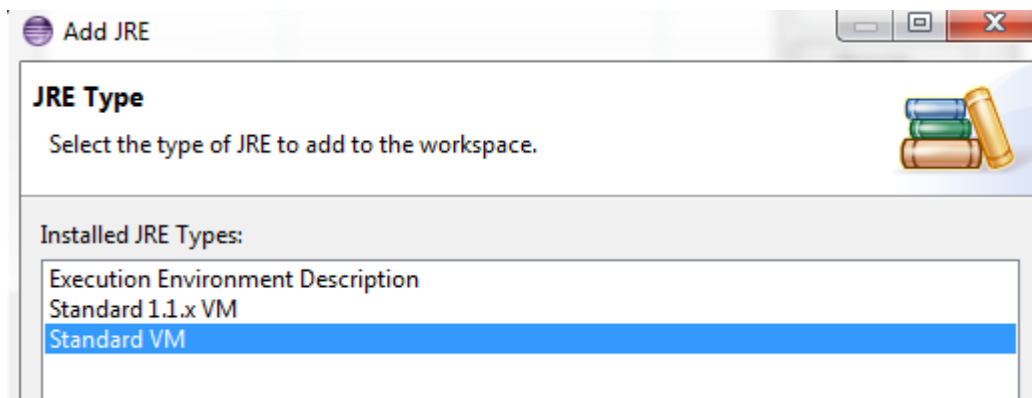
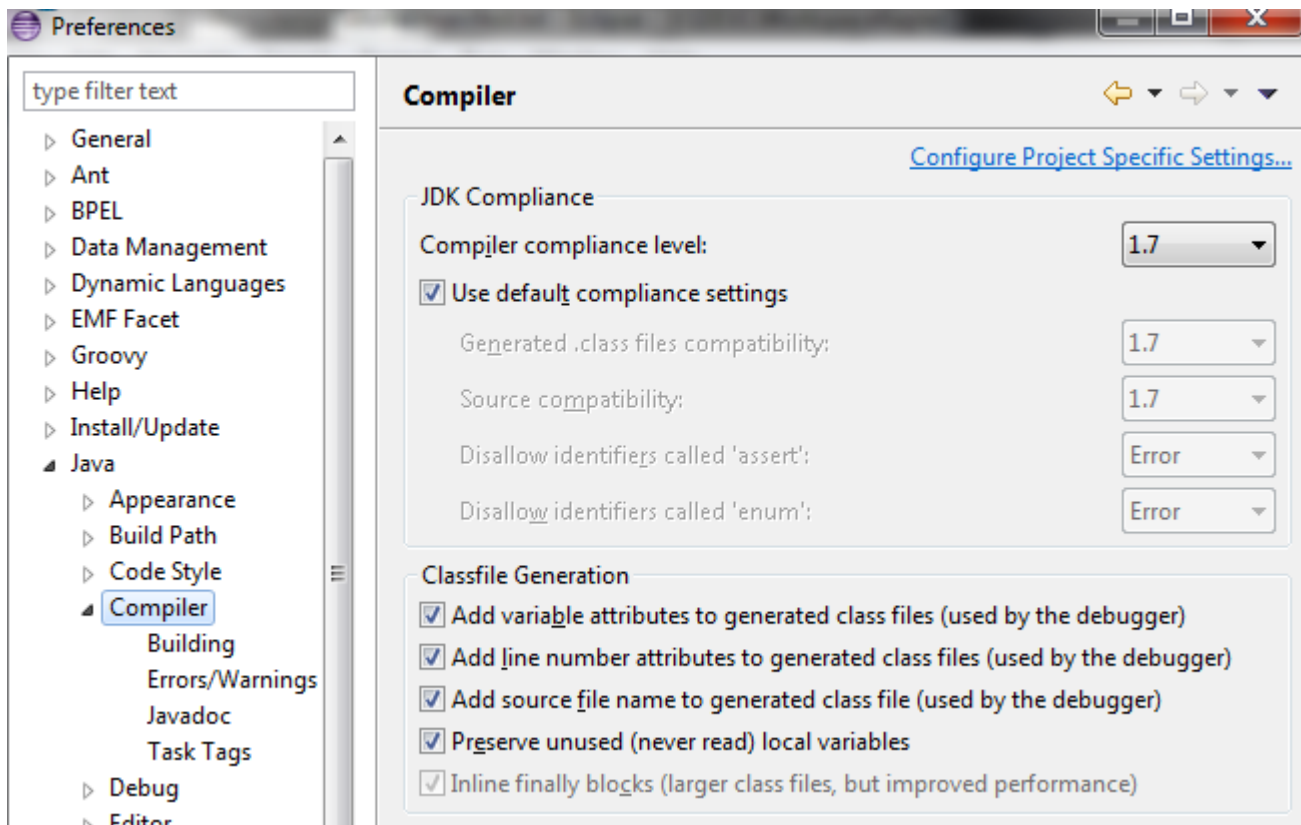
Export to JAR



Manifest contains info about an exported JAR
Must manually edit .manifest file to include XSTREAM JAR

```
-----  
Manifest-Version : 1.0  
Main-Class: org.persistence.tutorial.MyLibrary  
Class-Path: xstream-1.4.4.jar  
-----
```

Validate JDK Compliance Level when exporting as end-user must have atleast that version of JRE



Add JRE

JRE Definition

The JRE name is already in use.

JRE home:

JRE name:

Default VM arguments:

JRE system libraries:

V:\DEV\Java\java32\jdk6u33-src\jre\lib\resources.jar

V:\DEV\Java\java32\jdk6u33-src\jre\lib\rt.jar

V:\DEV\Java\java32\jdk6u33-src\jre\lib\jsse.jar

V:\DEV\Java\java32\jdk6u33-src\jre\lib\jce.jar

V:\DEV\Java\java32\jdk6u33-src\jre\lib\charsets.jar

V:\DEV\Java\java32\jdk6u33-src\jre\lib\ext\dnsns.jar

V:\DEV\Java\java32\jdk6u33-src\jre\lib\ext\localedata.jar

V:\DEV\Java\java32\jdk6u33-src\jre\lib\ext\sunjce_provider.jar

V:\DEV\Java\java32\jdk6u33-src\jre\lib\ext\sunmscapi.jar

V:\DEV\Java\java32\jdk6u33-src\jre\lib\ext\sunpkcs11.jar

Installed JREs:

Name	Location	Type
<input checked="" type="checkbox"/> jdk6u33-src...	V:\DEV\Java\java32\jdk6u33...	Standard
<input type="checkbox"/> jdk7u17-src	V:\DEV\Java\java32\jdk7u17-src	Standard

Exporting

Install

Java

JAR file

Javadoc

Runnable JAR file

JAR File Specification

Define which resources should be exported into the JAR.



Select the resources to export:

- ☐ Characters
- ☐ JavaLib
- ☒ PersistenceTutorial
 - ☒ src
 - ☒ org.persistence.tutorial
 - ☐ test
 - ☐ org.persistence.tutorial
- ☐ Strings

- ☐ .classpath
- ☐ .project
- ☐ manifest.txt
- ☐ MyScrapbook.jpape
- ☐ testmylibrary.xml
- ☐ testsavestring.txt

- ☒ Export generated class files and resources
- ☐ Export all output folders for checked projects
- ☒ Export Java source files and resources
- ☐ Export refactorings for checked projects. [Select refactorings...](#)

Select the export destination:

JAR file: V:\DEVL\WorkspaceKepler\persistence.jar

[Browse...](#)

Options:

- ☒ Compress the contents of the JAR file
- ☐ Add directory entries
- ☒ Overwrite existing files without warning

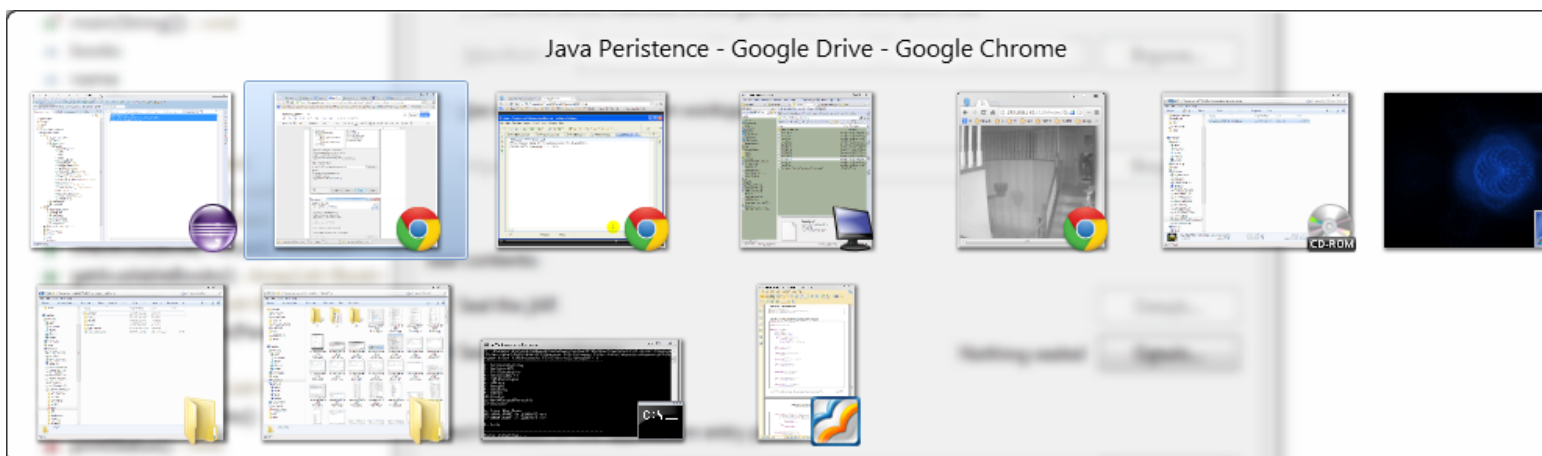
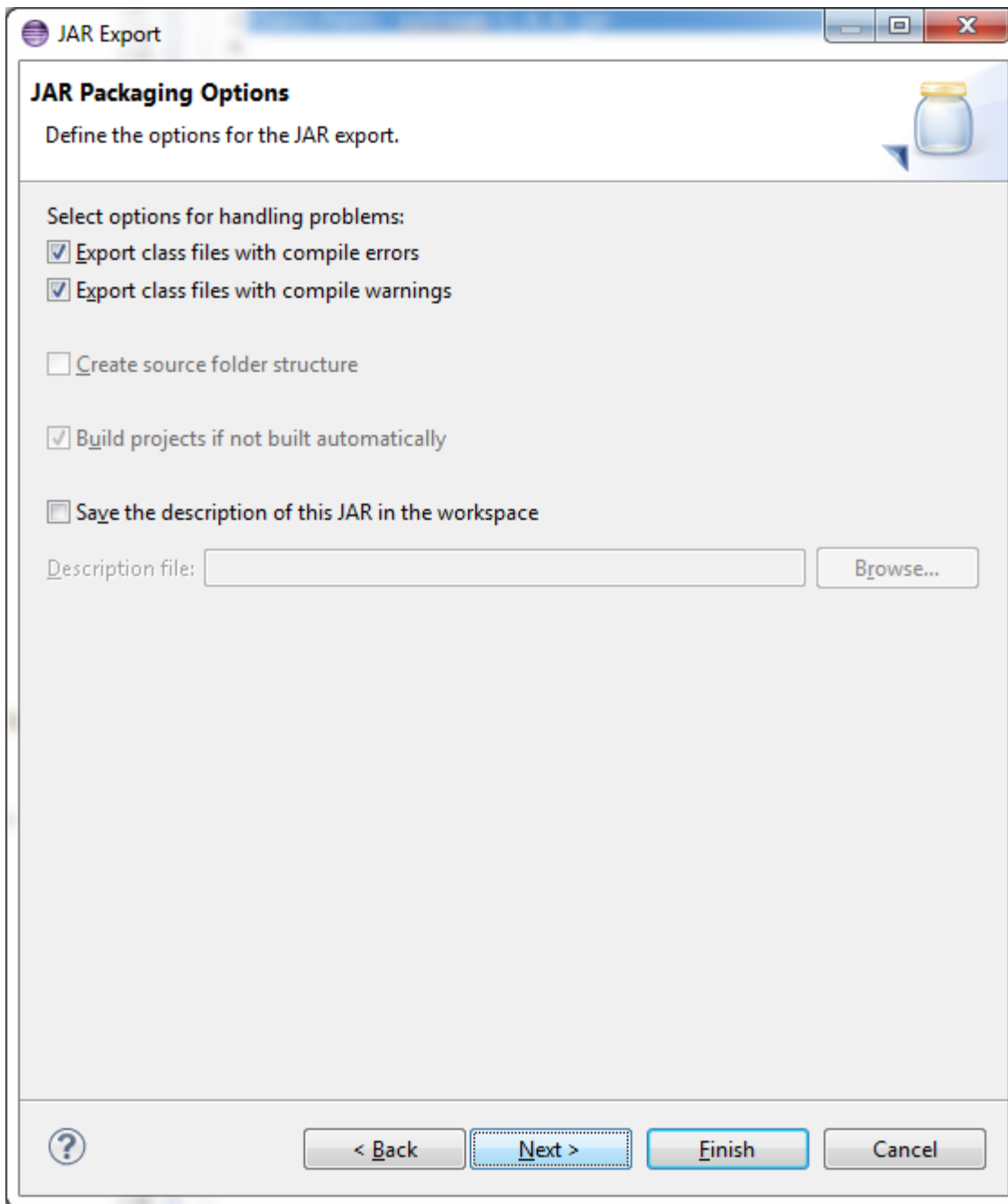


< Back

Next >

Finish

Cancel



Specify the manifest:

☒ Generate the manifest file

☐ Save the manifest in the workspace

☐ Use the saved manifest in the generated JAR description file

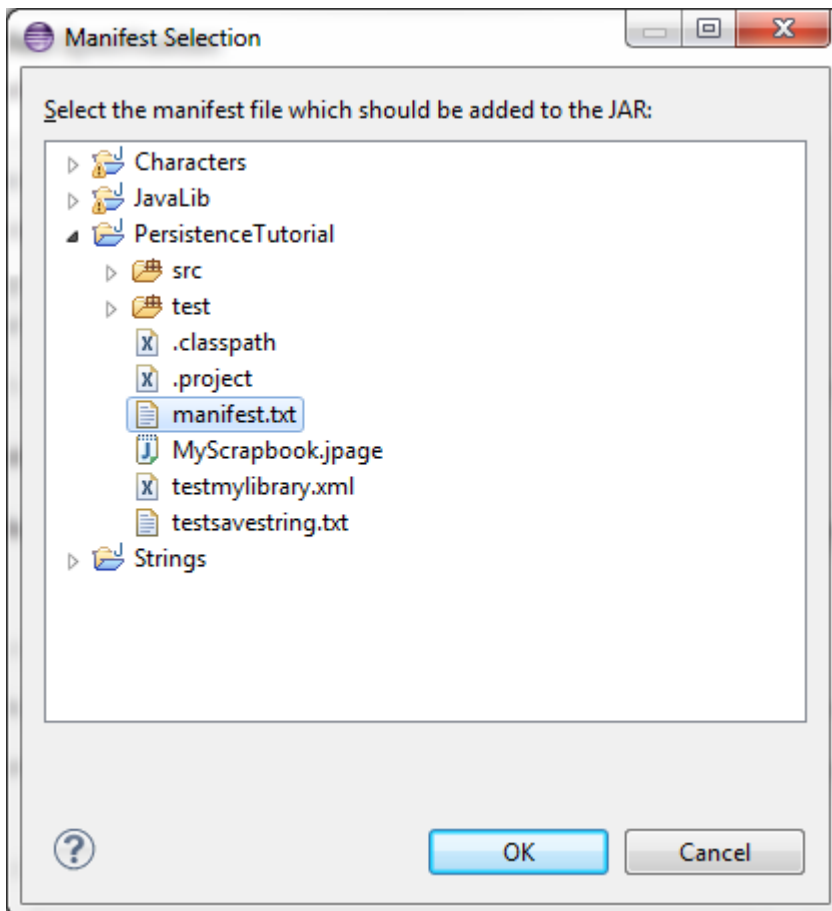
Manifest file:

Browse...

☐ Use existing manifest from workspace

Manifest file:

Browse...



☒ Use existing manifest from workspace

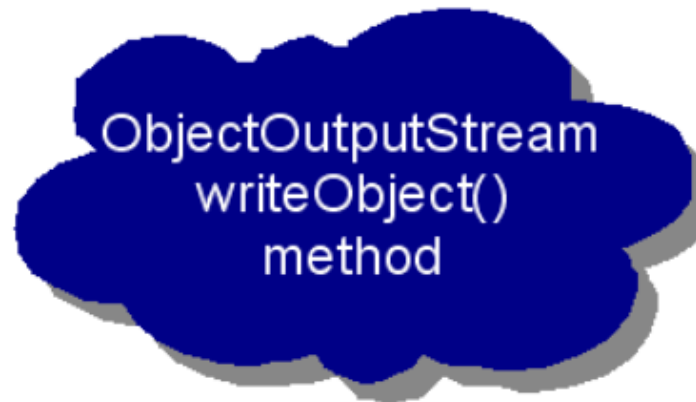
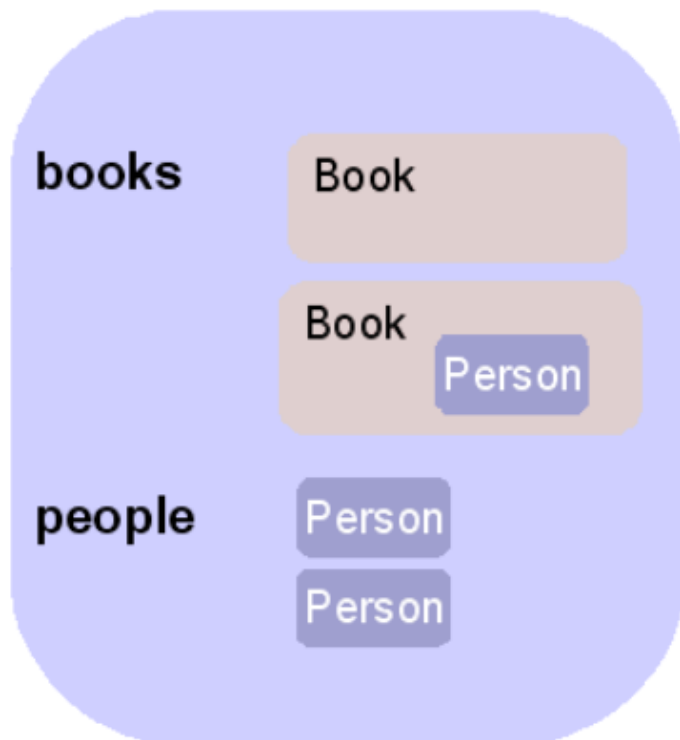
Manifest file: /PersistenceTutorial/manifest.txt

Browse...

Lesson 11: Java Serialization

Java Serialization

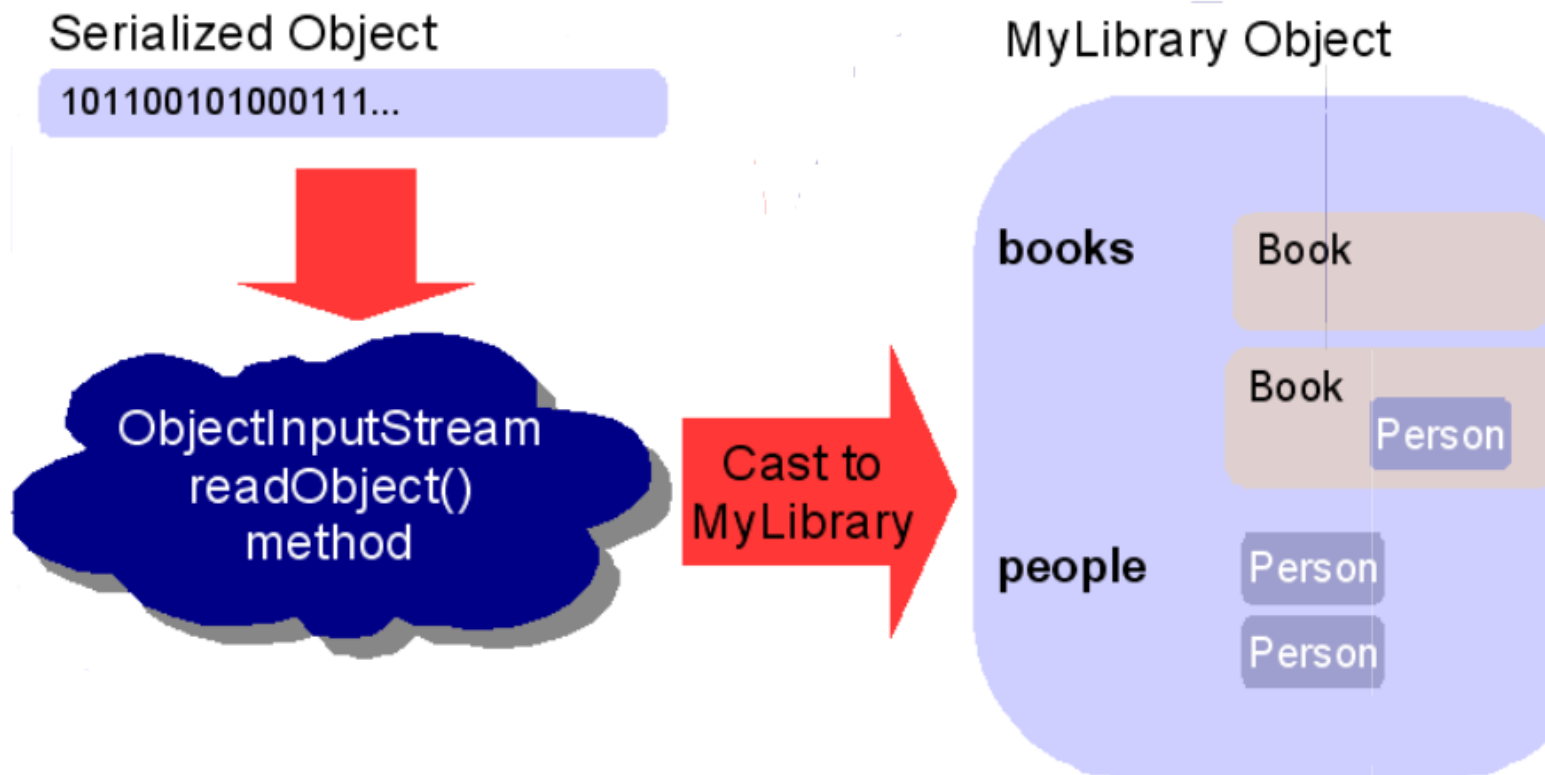
MyLibrary Object



Serialized Object

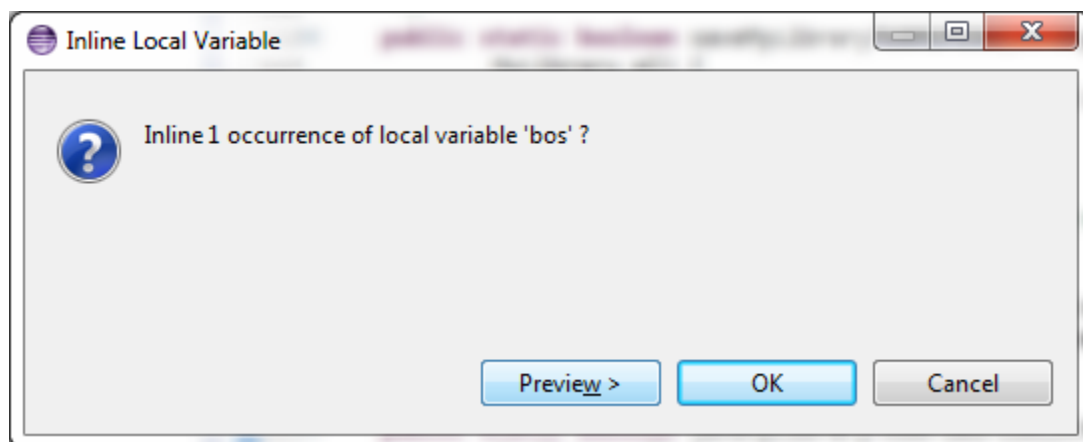
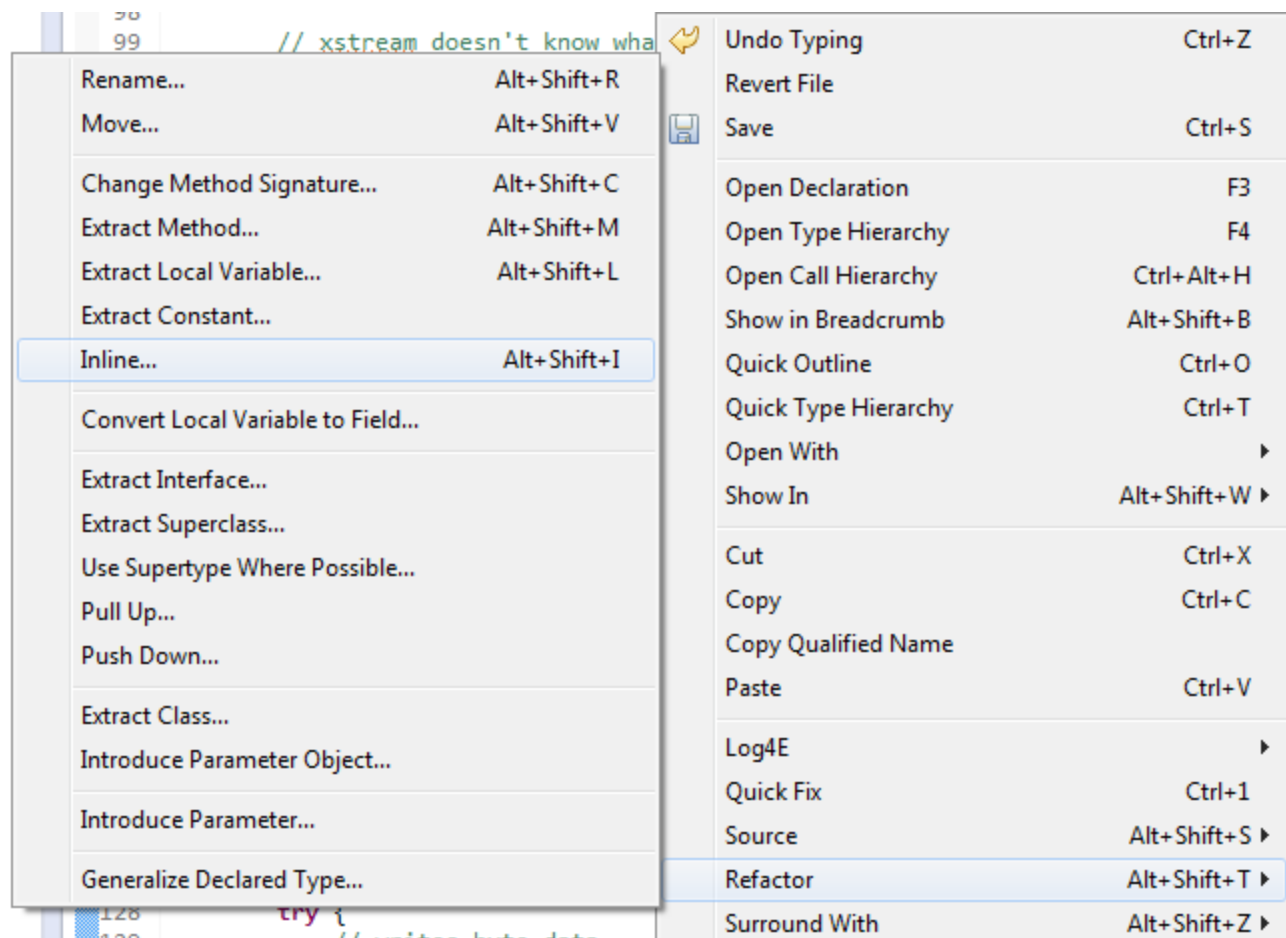
101100101000111...

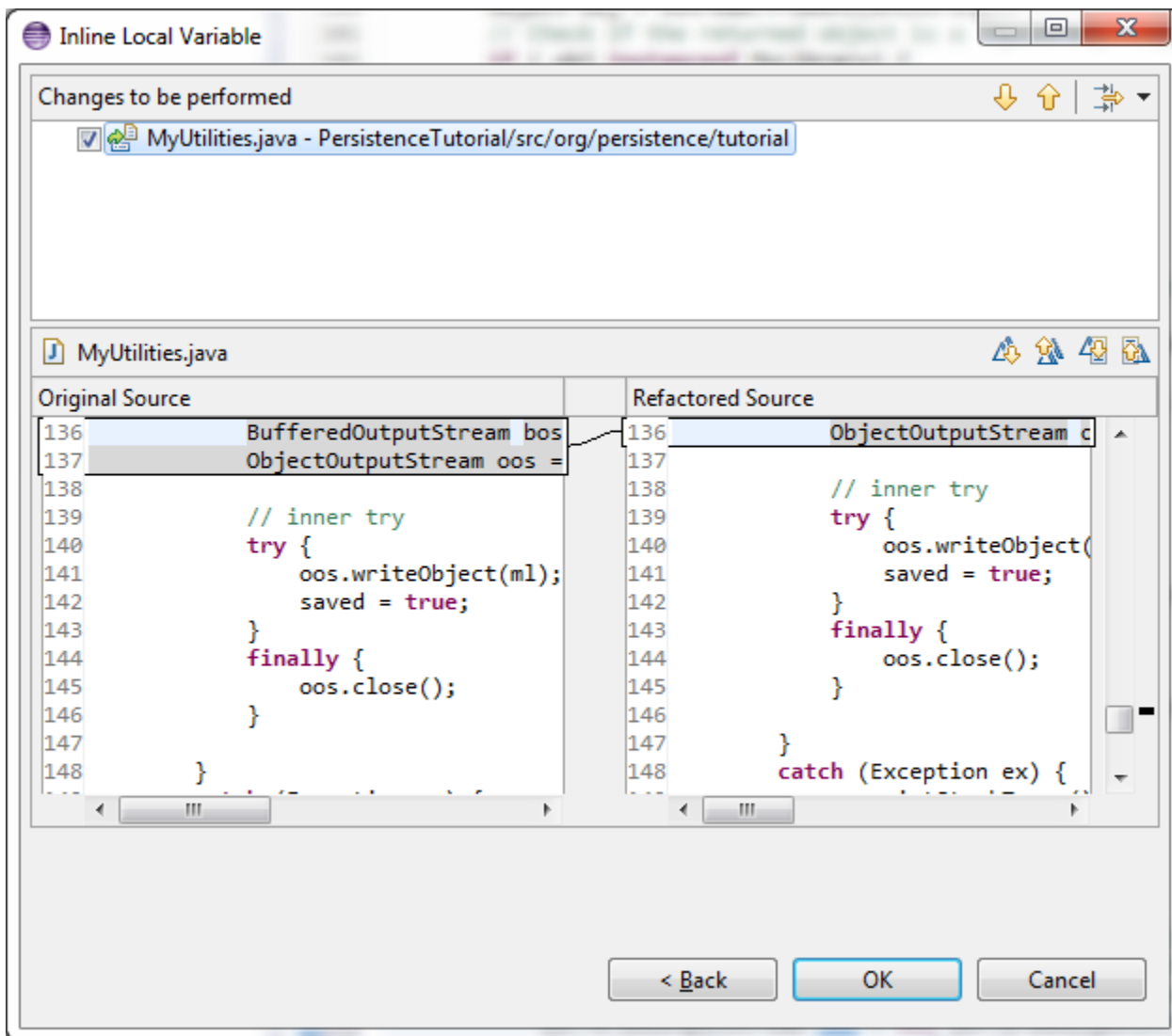
Java Serialization



Using Inline...

```
// embed oos to bos
//FileOutputStream fos = new FileOutputStream(fileName);
//BufferedOutputStream bos = new BufferedOutputStream(fos);
//ObjectOutputStream oos = new ObjectOutputStream(bos);
BufferedOutputStream bos = new BufferedOutputStream(new FileOutputStream(fileName));
ObjectOutputStream oos = new ObjectOutputStream(bos);
```





Original Code

```

        BufferedOutputStream bos = new BufferedOutputStream(new
FileOutputStream(fileName));
        ObjectOutputStream oos = new ObjectOutputStream(bos);

```

Resultant Code

```

        ObjectOutputStream oos = new ObjectOutputStream(
            new BufferedOutputStream(
                new FileOutputStream(fileName)));

```

Java uses a unique `SerialNumber` for each class...best to provide a Serial number to control future versions

Automatic serial number

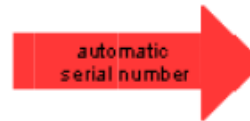


1. Object serialized with old serial number (e.g., 123).

2. Class is changed, so new automatic serial number is 234.

3. Can't cast read object back to MyLibrary type.

MyLibrary Object



Serialized Object
Serial number = 123

10110010100011...

readObject()



Object

Old version of MyLibrary not same type as current MyLibrary



(obj instanceof MyLibrary) is false

Manual serialVersionUID field

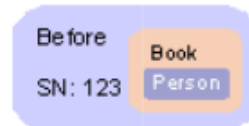


1. Object serialized with old serial number (e.g., 123).

2. Class is changed, but serial number is still 123.

3. Can cast read object back to MyLibrary type. (Need to figure out what to do about new fields – leave blank or provide default values.)

MyLibrary Object



Serialized Object
Serial number = 123

10110010100011...

readObject()



Object

Old version of MyLibrary is still same type as current MyLibrary



(obj instanceof MyLibrary) is true.



```
public class Book implements Serializable {
```

Adds a default serial version ID to the selected type.

Use this option to add a user-defined ID in combination with custom serialization code if the type did undergo structural changes since its first release.

- + Add default serial version ID
- + Add generated serial version ID
- Rename in file (Ctrl+2, R)
- Rename in workspace (Alt+Shift+R)
- @ Add @SuppressWarnings 'serial' to 'Book'