The Java™ Tutorials

Trail: Essential Classes
Lesson: Exceptions
Section: Catching and Handling Exceptions

The try-with-resources Statement

The `try`-with-resources statement is a `try` statement that declares one or more resources. A *resource* is an object that must be closed after the program is finished with it. The `try`-with-resources statement ensures that each resource is closed at the end of the statement. Any object that implements `java.lang.AutoCloseable`, which includes all objects which implement `java.io.Closeable`, can be used as a resource.

The following example reads the first line from a file. It uses an instance of `BufferedReader` to read data from the file. `BufferedReader` is a resource that must be closed after the program is finished with it:

```
static String readFirstLineFromFile(String path) throws IOException {
    try (BufferedReader br =
                   new BufferedReader(new FileReader(path))) {
        return br.readLine();
    }
}
```

In this example, the resource declared in the `try`-with-resources statement is a `BufferedReader`. The declaration statement appears within parentheses immediately after the `try` keyword. The class `BufferedReader`, in Java SE 7 and later, implements the interface `java.lang.AutoCloseable`. Because the `BufferedReader` instance is declared in a `try`-with-resource statement, it will be closed regardless of whether the `try` statement completes normally or abruptly (as a result of the method `BufferedReader.readLine` throwing an `IOException`).

Prior to Java SE 7, you can use a `finally` block to ensure that a resource is closed regardless of whether the `try` statement completes normally or abruptly. The following example uses a `finally` block instead of a `try`-with-resources statement:

```
static String readFirstLineFromFileWithFinallyBlock(String path)
                                                     throws IOException {
    BufferedReader br = new BufferedReader(new FileReader(path));
    try {
        return br.readLine();
    } finally {
        if (br != null) br.close();
    }
}
```

However, in this example, if the methods `readLine` and `close` both throw exceptions, then the method `readFirstLineFromFileWithFinallyBlock` throws the exception thrown from the `finally` block; the exception thrown from the `try` block is suppressed. In contrast, in the example `readFirstLineFromFile`, if exceptions are thrown from both the `try` block and the `try`-with-resources statement, then the method `readFirstLineFromFile` throws the exception thrown from the `try` block; the exception thrown from the `try`-with-resources block is suppressed. In Java SE 7 and later, you can retrieve suppressed exceptions; see the section Suppressed Exceptions for more information.

You may declare one or more resources in a `try`-with-resources statement. The following example retrieves the names of the files packaged in the zip file `zipFileName` and creates a text file that contains the names of these files:

```
public static void writeToFileZipFileContents(String zipFileName,
                                               String outputFileName)
                                               throws java.io.IOException {


    java.nio.charset.Charset charset =
         java.nio.charset.StandardCharsets.US_ASCII;
    java.nio.file.Path outputFilePath =
```

```
     java.nio.file.Paths.get(outputFileName);

// Open zip file and create output file with
// try-with-resources statement

try (
    java.util.zip.ZipFile zf =
         new java.util.zip.ZipFile(zipFileName);
    java.io.BufferedWriter writer =
        java.nio.file.Files.newBufferedWriter(outputFilePath, charset)
) {
    // Enumerate each entry
    for (java.util.Enumeration entries =
                            zf.entries(); entries.hasMoreElements();) {
        // Get the entry name and write it to the output file
        String newLine = System.getProperty("line.separator");
        String zipEntryName =
             ((java.util.zip.ZipEntry)entries.nextElement()).getName() +
             newLine;
        writer.write(zipEntryName, 0, zipEntryName.length());
    }
}
```

In this example, the `try`-with-resources statement contains two declarations that are separated by a semicolon: `ZipFile` and `BufferedWriter`. When the block of code that directly follows it terminates, either normally or because of an exception, the `close` methods of the `BufferedWriter` and `ZipFile` objects are automatically called in this order. Note that the `close` methods of resources are called in the *opposite* order of their creation.

The following example uses a `try`-with-resources statement to automatically close a `java.sql.Statement` object:

```
public static void viewTable(Connection con) throws SQLException {

    String query = "select COF_NAME, SUP_ID, PRICE, SALES, TOTAL from COFFEES";

    try (Statement stmt = con.createStatement()) {
        ResultSet rs = stmt.executeQuery(query);

        while (rs.next()) {
            String coffeeName = rs.getString("COF_NAME");
            int supplierID = rs.getInt("SUP_ID");
            float price = rs.getFloat("PRICE");
            int sales = rs.getInt("SALES");
            int total = rs.getInt("TOTAL");

            System.out.println(coffeeName + ", " + supplierID + ", " +
                               price + ", " + sales + ", " + total);
        }
    } catch (SQLException e) {
        JDBCTutorialUtilities.printSQLException(e);
    }
}
```

The resource `java.sql.Statement` used in this example is part of the JDBC 4.1 and later API.

Note: A `try`-with-resources statement can have `catch` and `finally` blocks just like an ordinary `try` statement. In a `try`-with-resources statement, any `catch` or `finally` block is run after the resources declared have been closed.

Suppressed Exceptions

An exception can be thrown from the block of code associated with the `try`-with-resources statement. In the example `writeToFileZipFileContents`, an exception can be thrown from the `try` block, and up to two exceptions can be thrown from the `try`-with-resources statement when it tries to close the `ZipFile` and `BufferedWriter` objects. If an exception is thrown from the `try` block and one or more exceptions are thrown from the `try`-with-resources statement, then those exceptions thrown from the `try`-with-resources statement are suppressed, and the exception thrown by the block is the one that is thrown by the `writeToFileZipFileContents` method. You can retrieve

these suppressed exceptions by calling the `Throwable.getSuppressed` method from the exception thrown by the `try` block.

Classes That Implement the AutoCloseable or Closeable Interface

See the Javadoc of the `AutoCloseable` and `Closeable` interfaces for a list of classes that implement either of these interfaces. The `Closeable` interface extends the `AutoCloseable` interface. The `close` method of the `Closeable` interface throws exceptions of type `IOException` while the `close` method of the `AutoCloseable` interface throws exceptions of type `Exception`. Consequently, subclasses of the `AutoCloseable` interface can override this behavior of the `close` method to throw specialized exceptions, such as `IOException`, or no exception at all.

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