Detecting Missing Thrown Exceptions in Enterprise Systems: an Empirical Study

Cristina Marinescu, cristina.marinescu@cs.upt.ro
LOOSE Research Group, “Politehnica” University of Timișoara, Romania

**Problem**

- Class IdiomaticBookDataSource
  ```java
class IdiomaticBookDataSource {
public String getAuthor(int id) {
    try {
        String query;
        query = "SELECT author from books " + "WHERE ID=" + id;
        ResultSet rs = statement.executeQuery(query);
        return rs.getString("author");
    } catch (SQLException e) {
        return null;
    }
}
```

**Goal**

- An approach that provides us with those methods from the data-source layer of enterprise systems that make use of an idiomatic style for dealing with exceptions and, consequently, are good candidates for refactoring.

**Approach**

- We find out the methods responsible for retrieving/storing the persistent data (the methods from the data-source layer).
- Using a simple approach – a method is considered to belong to the data-source layer if it invokes one or more methods from the library that provides the API for manipulating the persistent data (e.g., the method invokes the executeQuery() method from the java.sql package).
- We select from the data-source methods only those which do not throw exceptions.

**Results**

- Data-source methods which do not throw exceptions (percentage)
- Data-source methods which do not throw exceptions and return void

**Finding (example)**

```java
public double cardCredit(long cardNo) {
    double credit = 0;
    try {
        String sql;
        sql = "SELECT Credit From Credit_card " + "WHERE Number=" + cardNo;
        PreparedStatement pst; 
        ResultSet rs = pst.executeQuery(); 
        while (rs.next()) {
            credit = rs.getDouble("Credit"); 
            return credit; 
        } 
    } catch (SQLException ex) {
        System.out.println("SQL Exception"); 
        return credit; 
    }
} 
```

**Finding (example)**

- Returns 0 if the amount stored by card cardNo is zero
- The card cardNo does not exist
- The SQL command was not executed, due to an improper connection to the database or to a syntax error (the syntax of the embedded SQL can’t be verified by the compiler)

**Characterisitcs of data sources**

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<th>Methods</th>
<th>Tables</th>
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**References**