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Transaction Management with Spring Lab

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Transaction Management with Spring Lab

# Purpose

In this lab you will gain experience with using Spring’s declarative transaction management to open a transaction on entry to the application layer and pa in that transaction during all data access. You will use the `@Transactional` annotation to denote what methods need to be decorated with transactionalit

# Learning Outcomes

What you will learn:

1. How to identify where to apply transactionality
2. How to apply transactionality to a method

Specific subjects you will gain experience with:

1. The `@Transactional` annotation
2. The `PlatformTransactionManager` interface
3. The `@EnableTransactionManagement` bean definition
4. Using transactional integration tests

You will be using the *28-transactions* project.

Estimated time to complete: 20 minutes.

# Prerequisites

The prerequisites are included as part of the *Introduction to the Spring Professional Learning Path* course *Lab Setup* lesson.

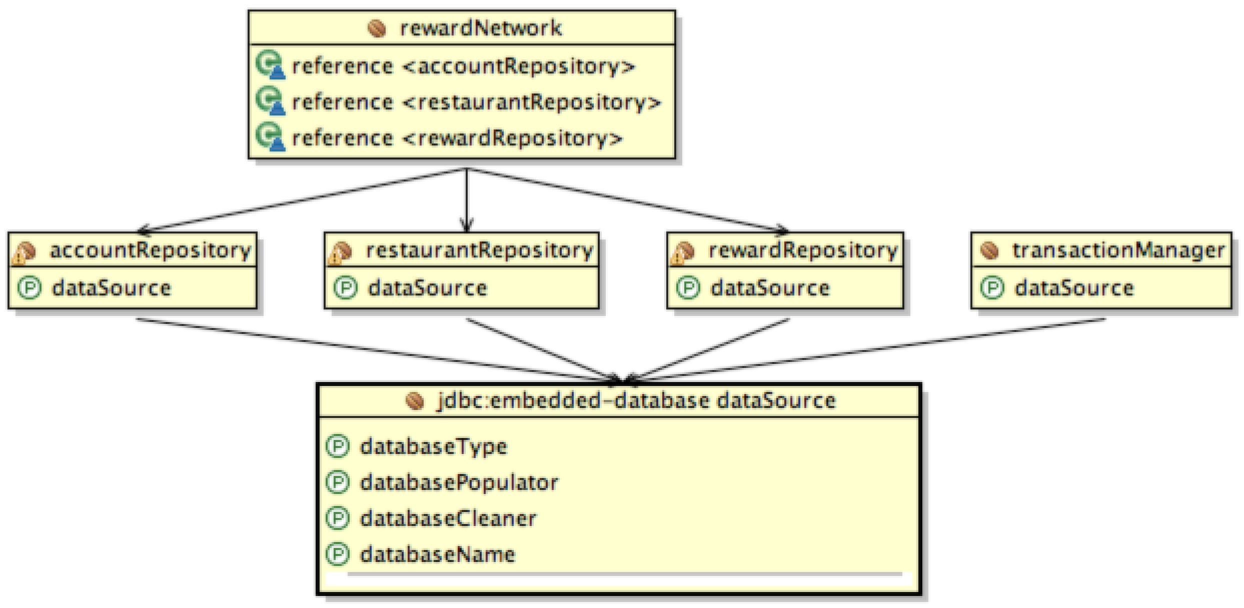
If you already completed it, you should be ready to do this lab. If not, assuming you already have JDK 11 or 17 installed and Java IDE, you will need to d following:

1. Download the **lab codebase zip file**.
2. Once you have downloaded the file, unzip it under a directory of your choice. The unzipped directory `core-spring-labfiles/lab` contains the lab projects.
3. Run `./mvnw clean install` (if you plan on using Maven as your build tool).

# Objectives

The goal of this lab is to declaratively add transactionality to the rewards application. The lab will be divided into two parts.

In the first part you will add transactions to the application and visually verify that your test case opens a single transaction for the entire use-case.



In the second section you will experiment with some of the settings for transaction management and see what outcomes they produce.

# Quick Instructions

If you are already knowledgeable with the lesson concepts, you may consider jumping right to the code, and execute the lab in form of embedded TODO comments. Instructions on how to view them are at the *Using TODO Tasks* article.

If you aren't sure, try the TODO instructions first and refer to the lab instructions by TODO number if you need more help.

# Instructions

Marking Transactional Boundaries

Spring offers a number of ways to configure transactions in an application.

In this lab we're going to use a strategy that leverages annotations to identify where transactionality should be applied and what configuration to use.

Annotating the Application

TODO-01: Add `@Transactional` annotation

- Find and open the `RewardNetworkImpl` class in the `rewards.internal` package.
- Locate the `rewardAccountFor(Dining)` method and add an `@Transactional` annotation to it.
- Why did we do this?

  Adding the annotation will identify this method as a place to apply transactional semantics at runtime.

TODO-02: Add Platform Transaction Manager

- Navigate to the `SystemTestConfig` configuration class and add a `DataSourceTransactionManager` bean.

  Remember to set the `dataSource` property on this bean.

TODO-03: Enable Annotated Transactions

- Find and open the `RewardsConfig.java` file in the `config` package.
- You need to tell Spring to look for the `@Transactional` annotation you just added to the `RewardNetworkImpl` class.

  To do this add a `@EnableTransactionManagement` annotation.

- Why did you do this?

  For backwards compatibility with older applications, Spring annotations are *not* enabled automatically, so you have to turn them on.

Verify Transactional Behavior

TODO-04: Verify that your transaction declarations are working correctly by running the `RewardNetworkTests` class from the `src/test/java` source fol should see output that looks like below. The important thing to note is that only a single connection is acquired and a single transaction is created.

```
DEBUG: o.s.j.d.DataSourceTransactionManager - Creating new transaction with name [rewards.internal.RewardNetworkImpl.rewa
DEBUG: o.s.j.d.DataSourceTransactionManager - Acquired Connection [org.hsqldb.jdbc.JDBCConnection@176b75f7] for JDBC trar
DEBUG: o.s.j.d.DataSourceTransactionManager - Switching JDBC Connection [org.hsqldb.jdbc.JDBCConnection@176b75f7] to manu
DEBUG: o.s.j.d.DataSourceTransactionManager - Initiating transaction commit
DEBUG: o.s.j.d.DataSourceTransactionManager - Committing JDBC transaction on Connection [org.hsqldb.jdbc.JDBCConnection@1
DEBUG: o.s.j.d.DataSourceTransactionManager - Releasing JDBC Connection [org.hsqldb.jdbc.JDBCConnection@176b75f7] after t
```

Note

If you look in the `setup()` of `RewardNetworkTests` you will see that we have enabled DEBUG logging for the `DataSourceTransactionManager`.

If your test completes successfully *and* you've verified that only a single connection and transaction are used, you've completed this section.

Configuring Spring's Declarative Transaction Management

Setting up Spring's declarative transaction management is pretty easy if you're just using the default propagation setting (`Propagation.REQUIRED`). How there are cases when you may want to suspend an existing transaction and force a certain section of code to run within a *new* transaction.

In this section, you will adjust the configuration of your reward network transaction in order to experiment with `Propagation.REQUIRES_NEW`.

Modify Propagation Behavior

TODO-05: Review `RewardNetworkPropagationTests`

- Find and open `RewardNetworkPropagationTests` from the `rewards` package in the `src/test/java` source folder.
- Take a look at the test in the class. As well as a simple verification of data in the database, it also performs manual transaction management.
  - The test opens a transaction at the beginning, (using the `transactionManager.getTransaction(..)` call).
  - Next, it executes `rewardAccountFor(Dining)`, then rolls back the transaction, and finally tests to see if data has been correctly inserted into t database.
- Run the test class with JUnit.
  - You'll see that the test has failed because the rollback removed all data from the database, including the data that was create the `rewardAccountFor(Dining)` method.

TODO-06: Change Propagation

- Open `RewardNetworkImpl` again.
- The `@Transactional` annotation will use the default propagation level of `Propagation.REQUIRED` which means that it *will participate in any transac that already exists*.

  So when the manually created transaction was rolled back it discards all changes made by the `@Transactional` method.
- Override the default propagation behavior with `Propagation.REQUIRES_NEW`.

TODO-07: Rerun Test

- Run the `RewardNetworkPropagationTests`.

If you have successful test, you have verified that the test's transaction was suspended and the `rewardAccountFor(Dining)` method executed in i
transaction.

What we have just done was purely for demonstration only. In real life, the `rewardAccountFor` method *would* use the default propagation of `Propagation.REQUIRED`, with the test being considered inappropriate.

Developing Transactional Tests

When dealing with persistent data in a test scenario, it can be very expensive to ensure that preconditions are met before executing a test case. In additi being expensive, it can also be error prone with later tests inadvertently depending on the effects of earlier tests. In this section you'll learn about some o support classes Spring provides for helping with these issues.

Use @Transactional to isolate test cases

TODO-08: *IMPORTANT* Restore Default Propagation

- Return to `RewardNetworkImpl`.
- Undo your propagation changes from the previous section (change the propagation back to `Propagation.REQUIRED` instead of `Propagation.REQUIRES_NEW`). This is the appropriate propagation setting for this method.

TODO-09: Transactional Side-Effects

- Find and open `RewardNetworkSideEffectTests` from the `rewards` package in the `src/test/java` source folder.
- Take a look at the two tests in the class.
  - Notice that they simply call the `rewardAccountFor(Dining)` method, pass in some data, and verify that the data was recorded properly.
- Now run the test class with JUnit.
  - You'll see that the second test method failed with an error that Annabelle's savings was 8.0, when 4.0 was expected.
  - Why is this?

    The data committed from the first test case has violated the preconditions for the second test case.

TODO-10: Automatic Rollback in Transactional Tests

- Spring has a facility to help avoid this corruption of test data in a `DataSource`.
  - Simply annotate each test method with `@Transactional`
    - Or put `@Transactional` at the class level so it applies to all tests in the class.
  - This wraps each test case in its own transaction and rolls back that transaction when the test case is finished.
  - The effect of this is that data is never committed to the tables and therefore, the database is in its original state for the start of the next test cas
- Annotate the `RewardNetworkSideEffectTests` class with `@Transactional`.
- Run the test again and notice that test succeeds.
- Why did this work?

  Because the changes made by the first test were rolled back. Both tests start with the same database state, so the second test now gets the data it expected.

Congratulations, you are done with the lab!

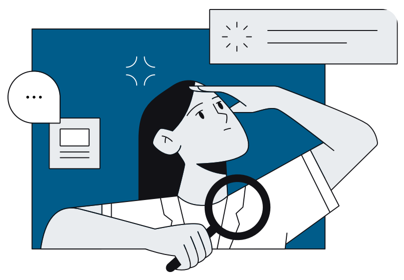
Summary **Instructors**

In this lab you gained experience Transaction management, propagation and testing when working with Databases in Spring and how to configure the completed reference domain.

Give Feedback

Help us improve by sharing your thoughts.

Give Feedback



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