Java Object-Oriented Concepts Unit

Lesson 7: Tiered Application Design Concepts

SOFTWARE GUILD

The Learning House

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Overview

We have seen that well-designed classes are cohesive and well-encapsulated. As we start to write more complex applications — applications with multiple classes and a wide-ranging set of capabilities — we need additional tools and techniques to keep our code clean and easily maintainable. One of these techniques is Tiered Application Design. In this lesson, we'll take a look at Tiered Application Design and how we can apply it to our labs now as well as how we'll apply this technique to our web applications in the future.

Why Should We Use Tiered Design?

Tiered application design allows us to ensure that our principles of separation of concerns, cohesion, and encapsulation are present in all parts of our applications. By keeping our concerns separated we can reuse components in a variety of environments - in other words our classes/layers are not tightly coupled to each other.

The Basic Tiers

The basics tiers in our applications are:

- **Storage**: files, database or other persistent storage
- **Data Access**: classes that handle retrieving and storing data
- **Business Logic**: classes that handle all logic specific to your problem domain
- **User Interface**: classes that handle all interaction with the user

In addition to these basic tiers, we also have what we call **data transfer objects (DTOs)**. DTOs are used to move data from one tier to another in our applications.

Packages

Packages can help us further organize our code. Each package is essentially a folder into which we place related classes. Each of the basic tiers has its own package and we generally put all of the DTOs into their own package as well:

1. DTOs go in the **dto** or **domain** package
2. Data Access Objects (DAOs) go in the **persistence** or **dao** package
3. Business Logic Objects go in the **operations** package
4. User Interface Objects go in the **ui** package

Tiered Design and the Web

Generally speaking, tiered design is overkill for console applications of the size we have been working on. However, we are using this approach in preparation for moving our applications to the web. We will be using a design pattern called Model-View-Controller (MVC), which is similar to the tiered design approach used thus far.