

Core Java 8 and Development Tools

Lesson 17 : Introduction to Layered Architecture



Lesson Objectives

After completing this lesson, participants will be able to

- Understand the concept of Layered Architecture
- Implement layers in Java applications



This lesson covers Layered architecture and advanced testing concepts.

Lesson outline:

- 17.1: Introduction
- 17.2: Layered Architecture

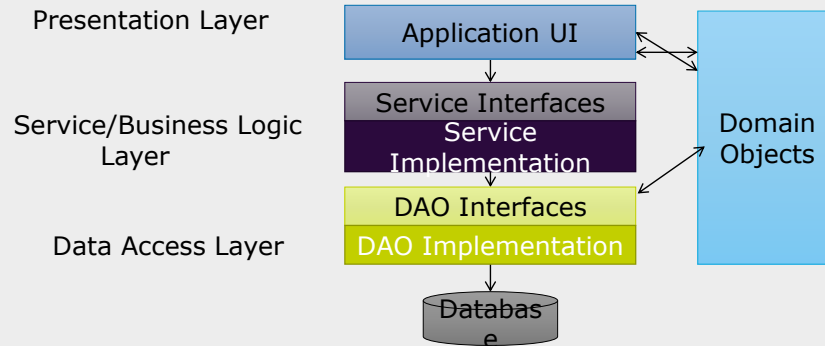
17.1: Introduction

What is Layered Architecture?

Layered architecture is one of the architectural pattern based on call-and-return style

In layered architecture, business rules, behavior, and data are obtained and manipulated, based on activity via the user interface.

Layered architecture provides a clean separation between the business implementation, presentation and data-access logic.



What is Layered Architecture?

Layering partitions the functionality of an application into separate layers that are stacked vertically. As shown in the figure above, layered architecture enables developer to make changes on one layer without having any side effects on others.

Why Layered Architecture?

Object technology encouraged the abstraction and reuse of not only presentation logic but also business processes and data. Therefore, decoupling application logic from application presentation is encouraged.

With the explosion of the Internet and related technologies, requirements to scale, rapidly develop, deploy, and react to business changes have made the existence of layered application architecture imperative.

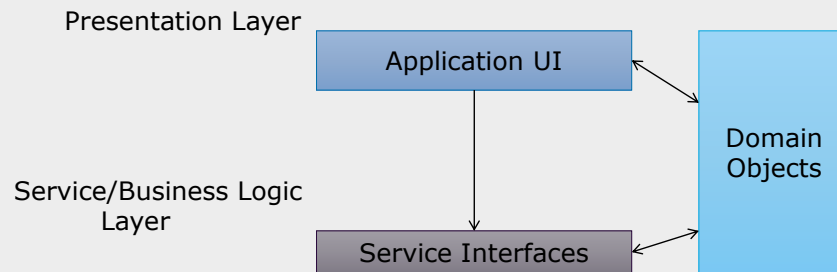
17.1: Introduction

Presentation Layer

Presentation layer consists of objects defined to accept user input and to display application outputs

Exception handling is also an important responsibility of this layer.

Presentation-layer simply request service/business layer for required functionality by sending and receiving domain objects



Presentation Layer:

The presentation layer contains the components that implement and display the user interface and manage user interaction. This layer includes controls for user input and display,

17.1: Introduction

Business Logic/Service Layer

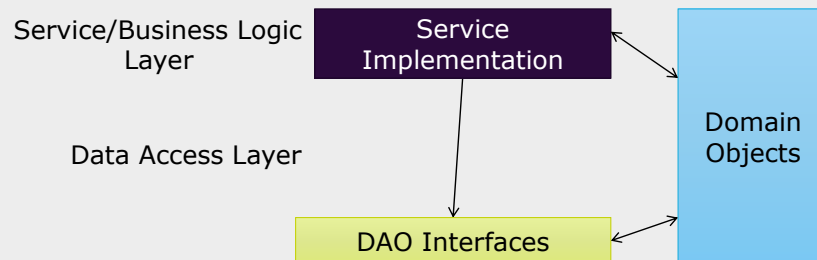


Business logic layer is concerned with the retrieval, processing, transformation and management of application data

This layer is responsible to implement business rules and policies

It also ensures data consistency and validity

Presentation layer passes data collected from UI to business layer and interact with business logic through abstract interfaces



Business Logic/Service Layer:

After the presentation layer collect the required data from the user and pass it to the business layer, the application can use this data to perform a business process. Use a business layer to centralize common business logic functions and promote reuse.

17.1: Introduction

Data Access Layer



This layer abstract the logic required to access the underlying data stores
It centralize common data access functionality in order to make the application easier to configure and maintain.

This layer is responsible for managing connections, generating queries, and mapping application domain objects to data source structures

Business logic layer interacts to data access layer through abstract interfaces using application domain objects

Data Access
Layer

DAO Implementation

Domain
Objects

Database

Data Access Layer

The data access layer should hide the details of data source access. It should be responsible for managing connections, generating queries, and mapping application domain objects to data source structures.

Consumers (Business logic layer) of the data access layer interact through abstract interfaces using application domain objects.

17.1: Introduction

Data Transfer Objects



Data transfer objects (DTO) or Value Objects (VO) encapsulates business data necessary to represent real world elements, such as Customers or Orders

These object are POJO's to store data values and expose them through properties

They contain and manage business data used by the entire application



Data Transfer Objects

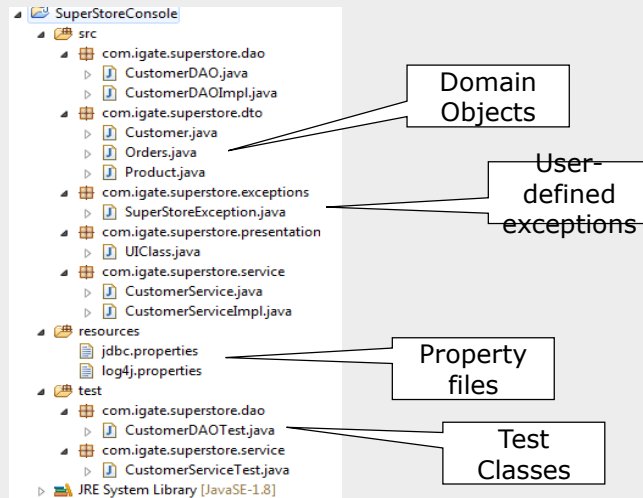
Data Transfer Objects

DTO's are simply POJO classes that represent application real world entities.

These objects are meant to share data between layers of application. These object contains data values and expose them through properties.

17.2: Layered Architecture

Sample Layered Application Structure



Designing Layered Application:

Create separate packages for all the layers including presentation, business logic and data access layer. All POJO based domain object needs to be stored in separate package.

Application specific exceptions must be separated from layered classes as shown in the slide.

Ensure the test classes must be written for DAO layers. Many business processes involve multiple steps that must be performed in the correct order. To ensure correctness of such business process, its better to test business layer classes too.

Database specific properties like username, password, URL etc. must be stored in separate property file. All property files must be store in resources folder of application.

Lab



Lab 11: Introduction to Layered Architecture



Summary



In this lesson, you have learnt:

- Layered architecture for Java applications



Review Question

Question 1: _____ layer abstract the logic required to access the underlying data stores

- Option 1: Service
- Option 2: Data Access
- Option 3: Presentation

Question 2: Layered architecture is one of the architectural pattern based on call-wait-process pattern style

- True / False

