

Business Process Digitalization and Cloud Computing

8. Design Service Implementations

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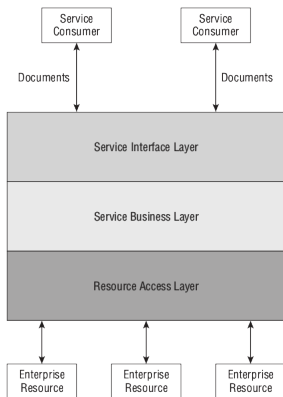


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Service architecture

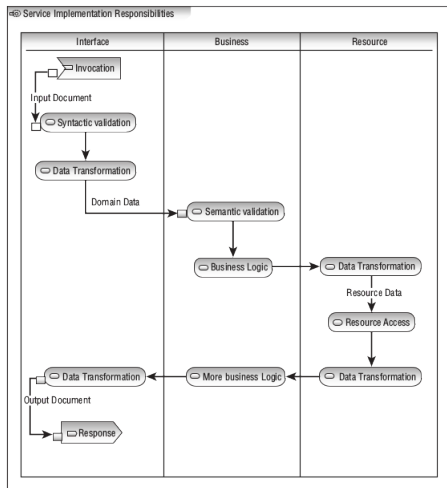
- A service is **not a simple class** that implement an interface, but should be looked as an **application** with all the characteristics thereof.
- **Service implementation model:**



Service implementation model

- **Service interface layer implements:**
 - ▶ the **service contract**
 - ▶ the **operations** provided by the service
 - ▶ the **document** associated with each operation
 - ▶ **data types** associated to the document
- **Service business layer implements:**
 - ▶ the **business logic rules**
 - ▶ the **state transitions**
- **Resource access layer permit the access to:**
 - ▶ the **enterprise resources** (database)
 - ▶ to existing **enterprise applications**
 - ▶ to other **business domain** and **utility services**

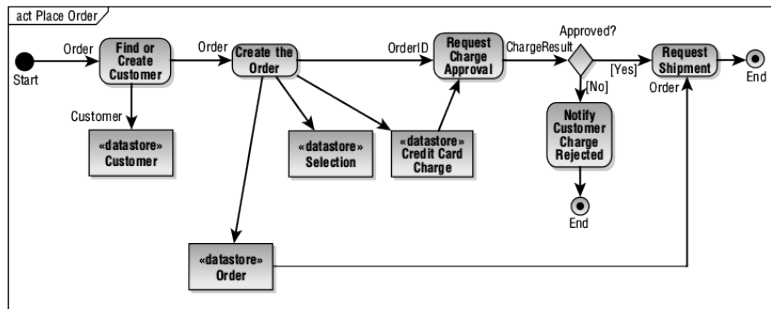
Layer responsibilities



- **Interface** receive the input documents and make any required translation required to invoke business entity.
- **Business layer** duty is to processing business required to implement service contract
- **Resources** is used to access resources.

- **Activity diagrams** can be used for defining the services implementation.
- **Operational logic** can be implemented using Java, C# so can be useful describe the operational flow using the UML activity diagram.
- **Activity diagram** is composed by:
 - ▶ input and output parameters
 - ▶ actions (rounded rectangles)
 - ▶ datastores contains domain data (squared-off rectangle)

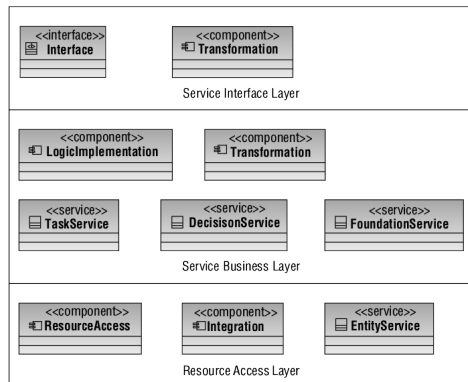
Activity diagram



- 1 Receives an Order document.
- 2 Finds the Customer of the Order. If not exists, it creates a new Customer.
- 3 Creates the Order with Selections and a Credit Card Charge.
- 4 Sends the credit card charge for the approval.
- 5 If the charge is approved, notifies the customer and sends the order to be packed and shipped.

Implementation of Service Layer Components

- **Interface:** exposes the operations of the service to the rest of the SOA.
- **Transformation:** change data from one format, schema, or semantic model to another.



Implementation of Business Layer Components

- **Logic implementation:** The business logic components implement the specific logical functions of the service operation.
- **Task Service:** implement business or logical tasks, such as common domain functions or business utilities.
- **Decision Service:** implement (complex) business rules and provide an external mechanism for specifying and maintaining the rules.
- **Foundation Service:** provide traditional platform distributed services such as authentication, logging and configuration.

Implementation of Resource Layer Components

- 1 **Integration Component:** exposes integration services and make their legacy functions and data available to the service operation.
- 2 **Resource Access Component:** encapsulate the access to resources, such as datastores.
- 3 **Entity Service:** provide common service-based access to common business entities.

Implementing the Interface Layer

- The implementation of a service interface starts with the **receiving of input document**.
- to be sure that the values are **meaningful and correct for the operation** is possible to validate the documents:
 - ▶ **Syntactic validation:** determines if the parameters are correctly formed.
 - ▶ **Semantic validation:** determines if the value are correct and meaningful.
- The parameter structures can be specified in the **schema files**. Syntactic validators can be **implemented** either in a interface layer or in the business layer.
- **Data transformation** from semantic data to business entity is straightforward and can be implemented in any general-purpose programming language.

Implementing the business layer

The business layer contains the implementation of **business logic and business entities**.

The business implementation consists on:

- Semantic validation of the input parameters
- Performing the business logic of the operation
- Returning a result

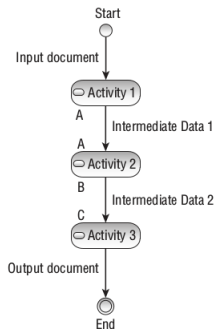
Semantic input validation

Semantic validations determine the **correctness of specific input values** according to business rule.

It require to examining the data in the context of the service's overall environment, ensuring that all of the **information** for the service invocation is **complete**.

FIELD	TEST
<code>Order.OrderNumber</code>	Must be unique and must be a valid number for the store
<code>Order.Date</code>	Must be today or later
<code>Selection.Product.SKU</code>	Must identify an existing product
<code>Selection.SelectionTotal</code>	Must be a quantity greater than zero
<code>CreditCardAccount.AccountNumber</code>	Must be a properly formatted number according to the rules of the credit card company
<code>CreditCardAccount.ExpirationDate</code>	Must be later than today
<code>CreditCardAccount.CardValidationNumber</code>	Must be legal for the credit card type and account number

Business logic of the operations



- The system **starts** with the input of data
- **Data transformation** is required between start and activity 1
- Activity 1 should **return the correct data** for activity 2 or transform the data
- Activity 3 is an utility service is necessary to decide **how to retrieve information**, what information is required for call the service and if you need **more information in input**.

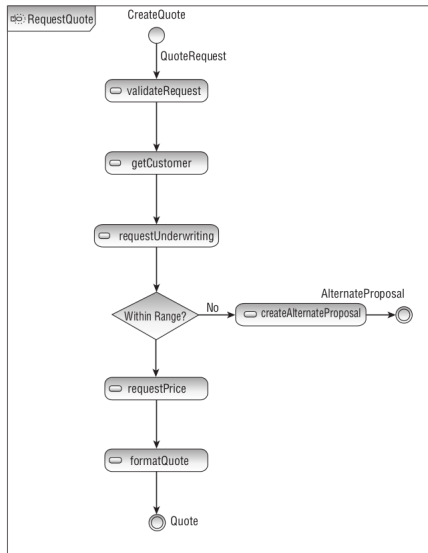
Computing and returning results

- The **returning results** depend by the type of computation:
 - ▶ custom code
 - ▶ components
 - ▶ existing services
- Returning results not require validation
- The **activities** involved are:
 - ▶ Collecting data
 - ▶ Calculation
 - ▶ Translation
 - ▶ Formatting the return document

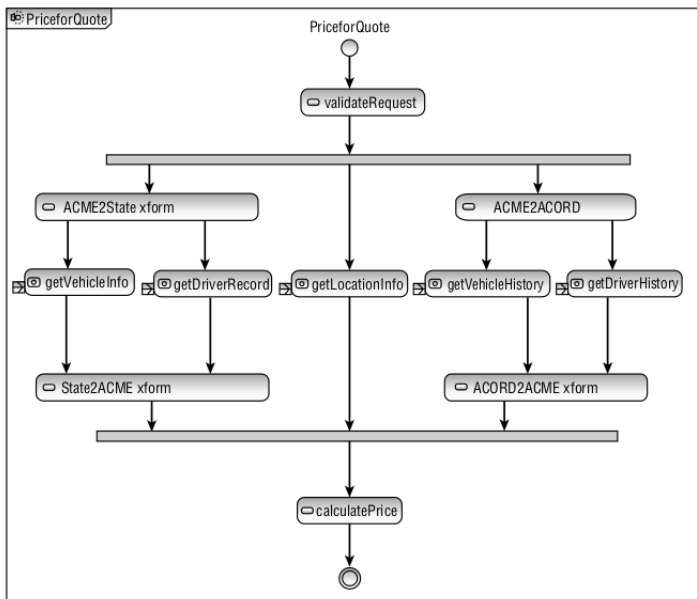
Implementing the resource layer

- **Data access logic:** is responsible for **retrieve business entity in a database** or other entity inside a business layer
- **Resource access layer:** contain **invocation to other services** to retrieve resources. This layer include the code for interaction with external resources.

Create Quote operation diagram



Automobile LOB Price for Quote procedure



Questions?