

IFML by Example: Modeling an Online Bookstore

This document exemplifies the versatility and adaptability of IFML by modeling the most common features available in a simple UI for a point of sale (POS) management, specifically targeted to a bookstore environment.

1 Content Model

During the session, an **User** is assigned a **Shopping cart** that at the beginning is empty. As the user browses through the page and gets information about the products available, adds products to the shopping cart. The list of products selected at the moment by the user, can be consulted at any time, offering the option of pay the current order, empty the cart or continue browsing in order to add more products.

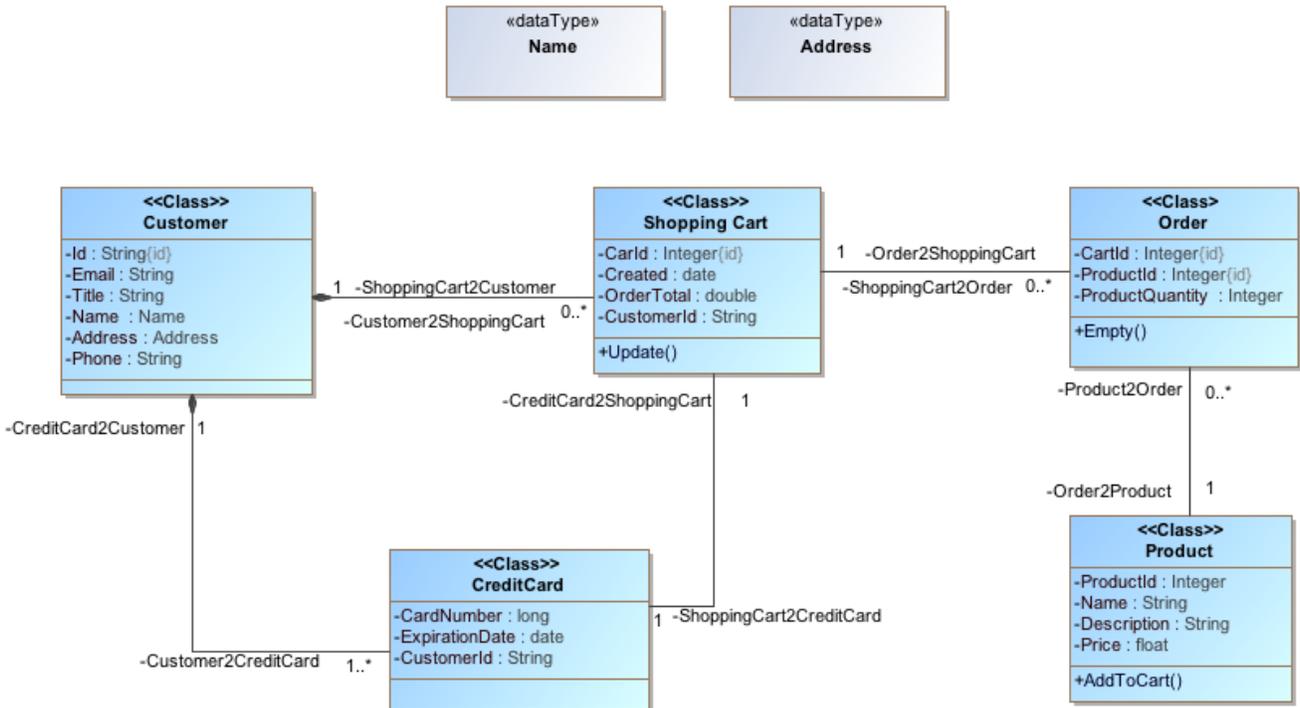


Figure 1: Content Model of the Online Bookstore

2 Process Model

When the user enters into the website, starts exploring the products available. Once he finds a product of interest, selects it, and the item goes to the shopping cart. The user can either keep exploring products in order to add more items to his order, or continue to manage the shopping cart by deleting all the products, or updating quantities of the selected ones. Once the user is ready to proceed with the payment, performs the checkout.

In order to authorize the payment, it's necessary to send the customer information to the bank entity, and wait for the confirmation. This procedure is illustrated in the Figure 2.

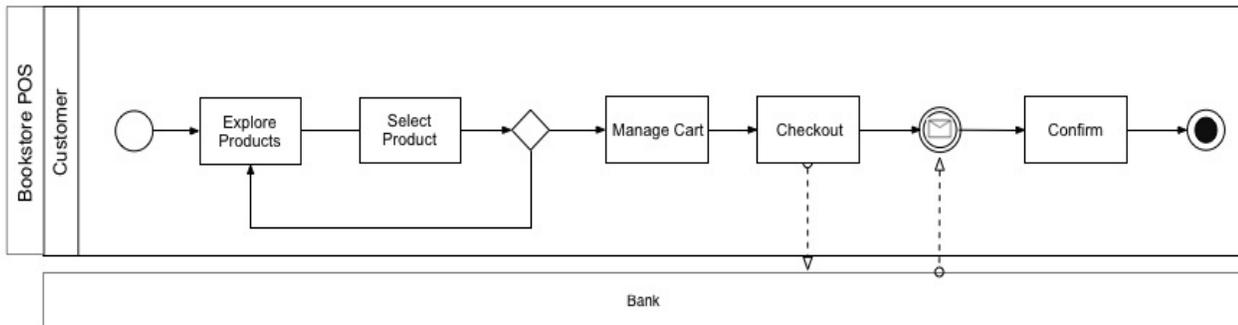


Figure 2: Process Model of the Online Bookstore

3 Model of the User Interaction Flow

Figure 3 shows the home page of the online Bookstore. In this section, the user can select one of the product categories, or go directly to the shopping cart.

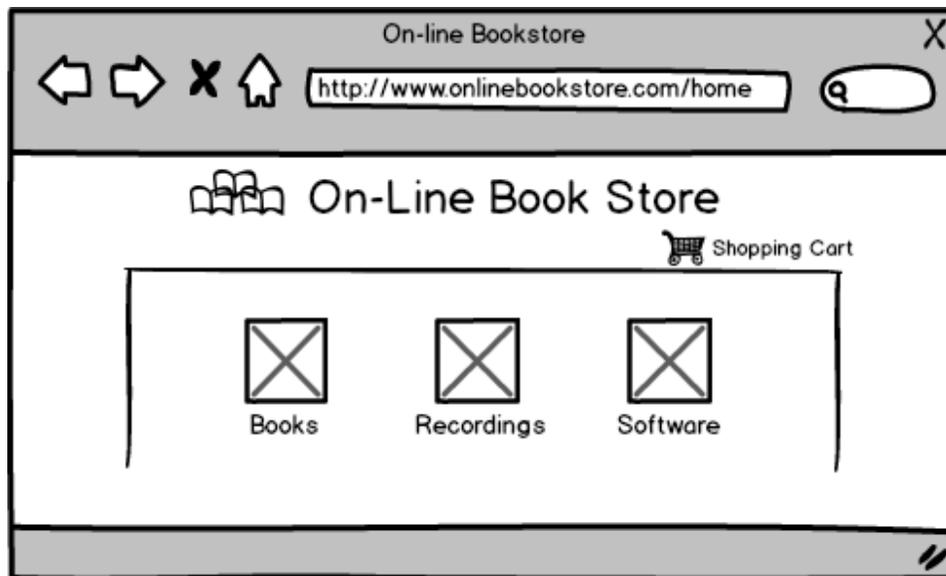


Figure 3: Online Bookstore Home Page

After selecting a category, a list of products is displayed. For instance, Figure 4 shows all the products belonging to the books category.

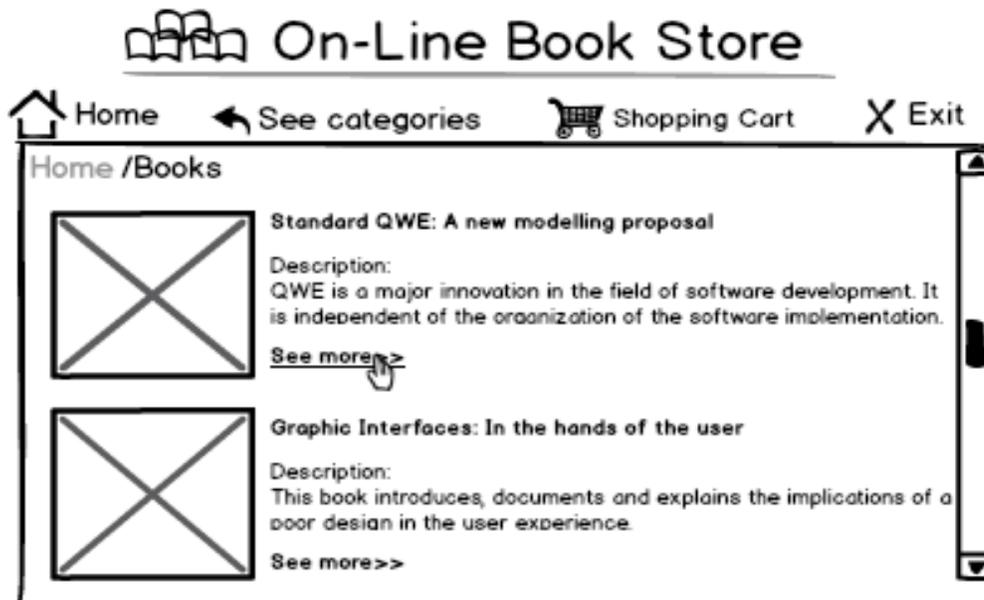


Figure 4: List of products belonging to the books category

When the user selects a product obtains the details of the selected item (such as full description and price) along with the option to add the product to the cart, as shown in the Figure 5.

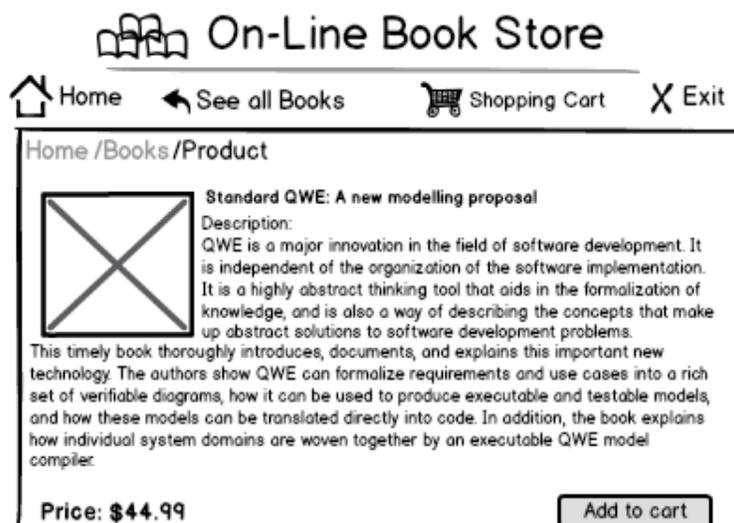


Figure 5: Details of the Selected Product

The procedure described in the figures 3,4, and 5 is represented in IFML as shown in the Figure 6. Once the user selects a category from *CategoryList* a navigation event is produced, and as a result, the products corresponding to the *SelectedCategory* are displayed. Similarly, when the user selects a product from *ProductList*, the details of the *SelectedProduct* are displayed.

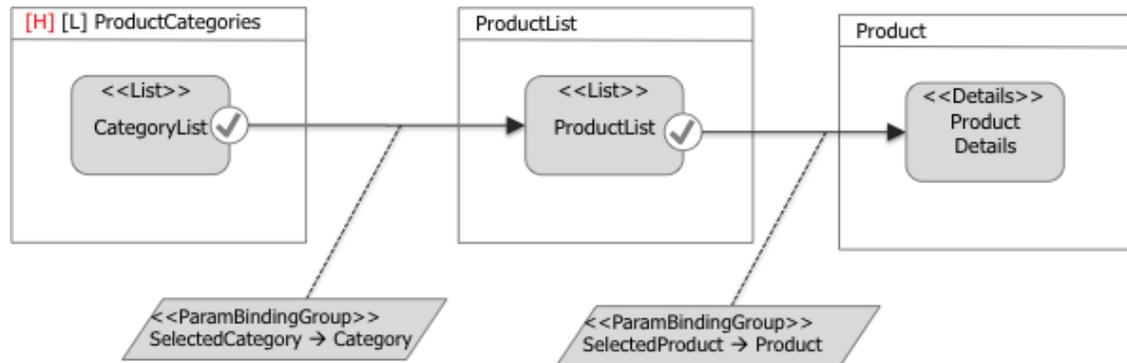


Figure 6: IFML model corresponding to the exploration of products

When the user decides to buy the product and add it to the cart, causes a modal view container to be displayed, where the user must provide the quantity of items of the desired product (see Figure 7). After accepting the quantity, the article is added to the cart, and a confirmation window is displayed as shown in the Figure 8.

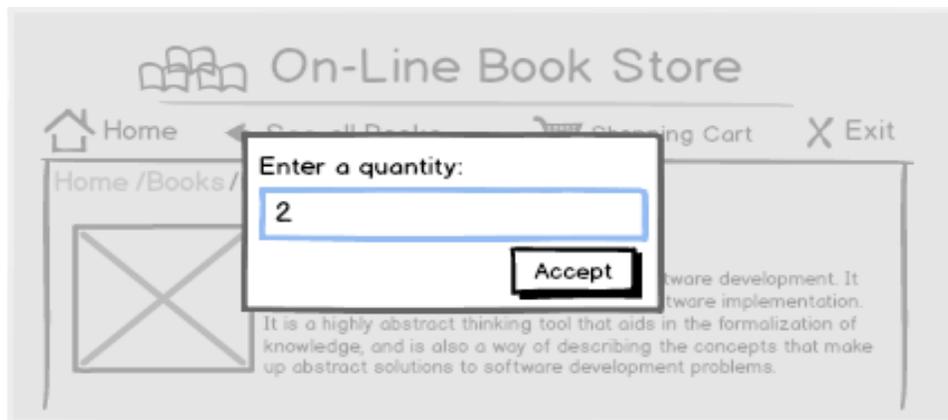


Figure 7: Window displayed in order to catch the number of items desired by the user

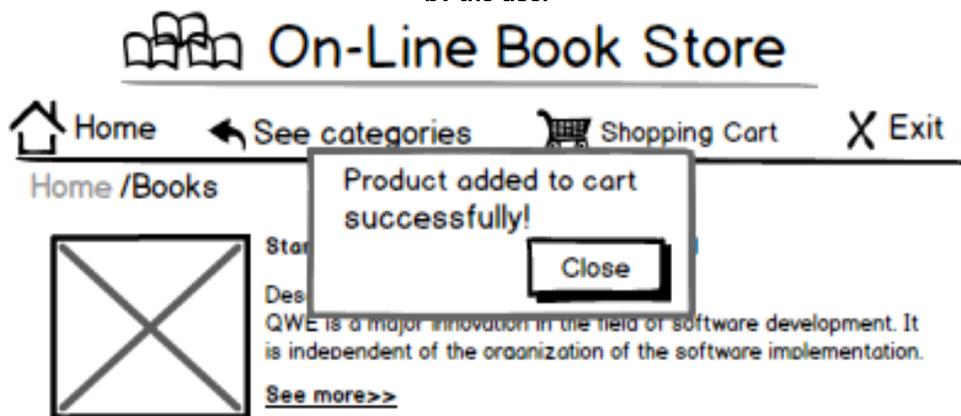


Figure 8: Confirmation window for the action add to cart

Figure 9 shows the model fragment that adds a product to the cart: once the user press the add to cart button, a modal window appears asking for the quantity of items desired. This value, along with the *SelectedProduct* are submitted as parameters and represent the input of the add to cart action triggered. Once the action is performed, a confirmation window is displayed.

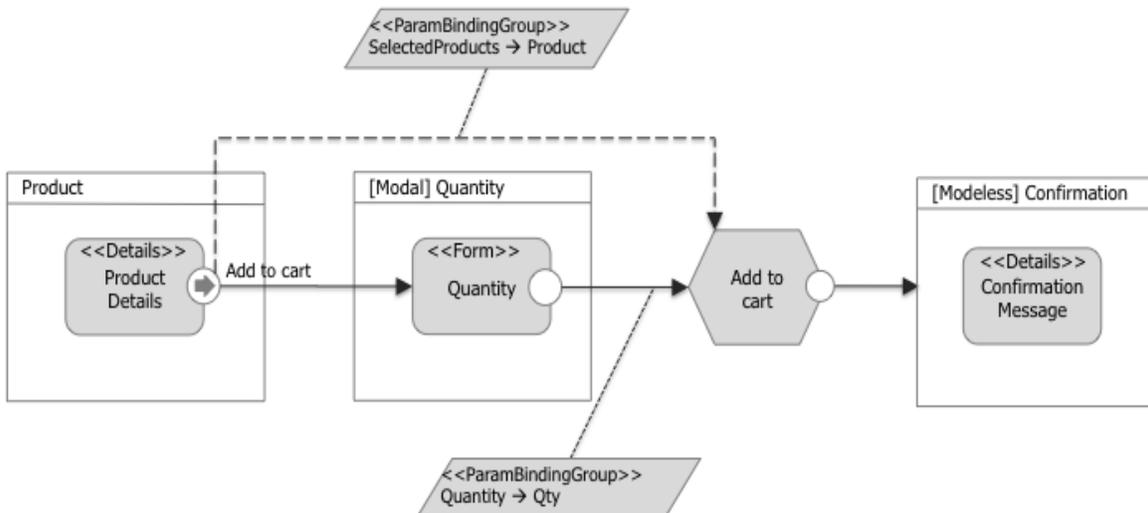


Figure 9: IFML model corresponding to the add to cart event

The shopping cart is the list of products previously selected by the user. In this section are shown the quantities and the order details. The user is able to *update the cart* by changing the quantities, *empty the cart* by deleting all the products of the current order, and start the payment process by clicking in the *checkout* button (see Figure 10).

When the user chooses to update the cart, the total amount is recalculated.

When the user empties the cart is redirected to a confirmation page as shown in the next Figure 11.

Home
X Exit

Shopping Cart

Product	Price	Quantity	Total
Standard QWE: A new modelling proposal	44.99	<input type="text" value="1"/>	44.99
Graphic Interfaces: In the hands of the user	23.99	<input type="text" value="3"/>	71.97
Lineal Algebra applied to web	39.99	<input type="text" value="1"/>	39.99
		<input type="button" value="Update"/>	

Sub Total Amount: \$ 156.95
 Tax Amount: \$ 0.0
 Discount Amount: \$ 0.0
Total Amount: \$ 156.95

Empty the cart
 Continue Shopping

Figure 10: Interface of the Shopping Cart


Shopping Cart Empty

Figure 11: Confirmation page for the Empty Shopping Cart Event

As illustrated in the IFML model of the Figure 12, when the user decide to delete all the items from the current order, the action *Empty the cart* is triggered, and after its execution, a confirmation message is displayed.

In the *Update* event, the user modify the values of the quantities and submits them by clicking in the button *Update*; this event causes an *Update* action to be triggered after which the shopping cart is redisplayed (see Figure 12).

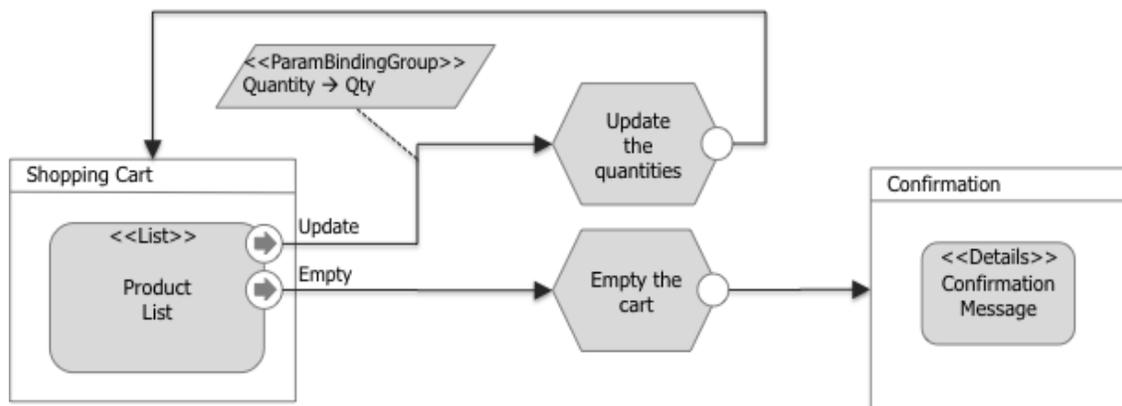


Figure 12: IFML model corresponding to the events Update and Empty of the Shopping cart

Once the user has decided to perform the payment, he must provide his personal information and press “Next” (see Figure 13).

 **On-Line Book Store**

 Home  Shopping Cart  Exit

Customer Information

E-Mail:	<input type="text" value="billy@mail.com"/>	Address Line 1:	<input type="text" value="Street Hamiton"/>
Title:	<input type="text" value="Mr."/>	Address Line 2:	<input type="text" value="45"/>
First Name:	<input type="text" value="Bill"/>	City:	<input type="text" value="New York"/>
Middle Name:	<input type="text"/>	State or Province:	<input type="text"/>
Last Name:	<input type="text" value="Feather"/>	Postal Code:	<input type="text"/>
Phone:	<input type="text" value="+51348576444"/>	Country:	<input type="text"/>

Figure 13: The user must provide its personal information and continue

After providing his personal information, the user must provide his bank account information and confirm the payment in order to proceed with the transaction (see Figure 14). After performing the transaction, a confirmation page appears showing the details of the payment as shown in the Figure 15.

 On-Line Book Store

[Home](#) [Back](#) [Shopping Cart](#) [Exit](#)

Payment Information

Cardholder Name: Mr. Bill Feathers

Address Line 1: Postal Code:

Address Line 2: Country:

City: Bank Card Account:

State or Province: Bank Card Expiration: 

Total Amount: \$ 156.95

Figure 14: The user must enter the bank account information and confirm the payment

 On-Line Book Store

[Home](#) [See categories](#) [Shopping Cart](#) [Exit](#)

Payment Performed Successfully!

 **Payment Details**

CREDIT CARD COMPANY
 Charge to: 8765432567876 for: \$156.95
 Charge APPROVED

CUSTOMER: john.feathers@mail.com
 CHARGE APPROVED

Figure 15: Payment confirmation

When the user chooses the Checkout option, the container *Customer Information* is displayed. The user must provide his personal information by filling out the form within this container.

After the user submits his personal information, the container *Payment Information* is displayed. In this container the user must provide his bank account details. The name of the user (sent previously as the

parameter: Name), is forwarded along with the credit card number (CC) and the total amount of the offer (previously sent by the shopping cart container) to the payment action (Execute the payment).

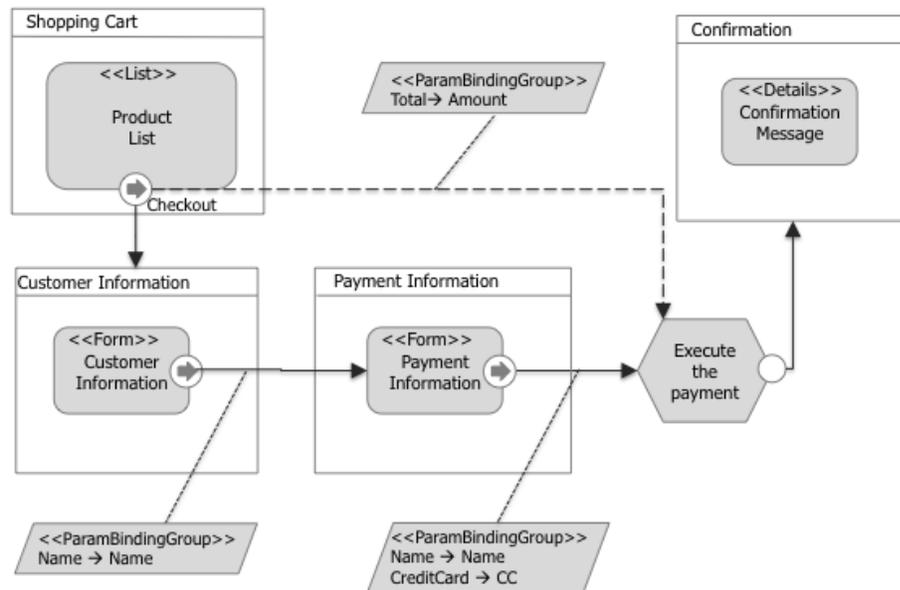


Figure 16: IFML model corresponding to the event Checkout

After the payment execution, a confirmation message is displayed with the transaction details. The IFML representation of this procedure is shown in the Figure 16.

To increase reusability and modularization in the models, designers may decide to cluster homogeneous parts of the model into Modules. For instance, the part of the model that deals with the payment management can be packaged into a specific module. This would simplify the model of the application, which would appear as in Figure 17.

The definition of the corresponding module is shown in Figure 18.

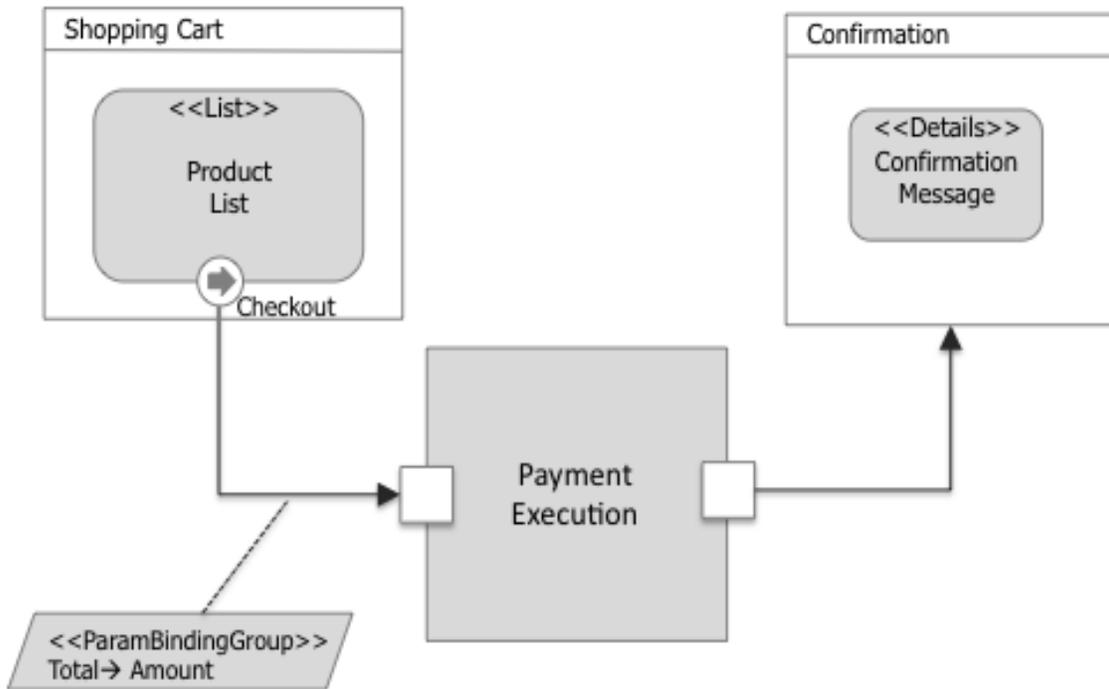


Figure 17: IFML Module Representation of the Checkout Event

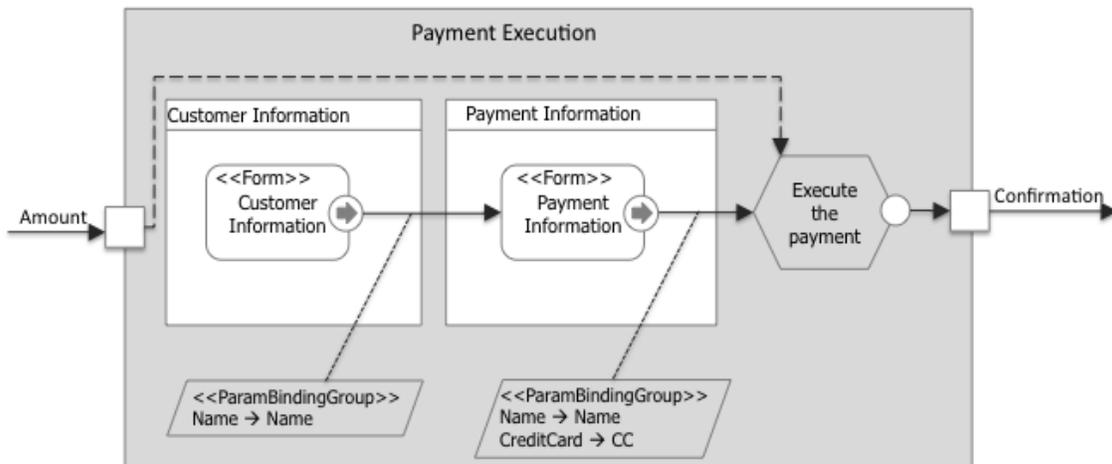


Figure 18: Inner Process of the Module Payment Execution

4 System Modeling

IFML can be suitably used together with UML models and other OMG standards (e.g., BPM models).

For instance, UML sequence diagrams complement IFML models at the purpose of highlighting sequences of activation of client- and server-side components depending on user interaction events.

In the example, when the customer chooses the option update, the *Browser* sends a message to the *WebServer* with the id of the product and the new quantity, then the *WebServer* updates the shopping cart and returns a confirmation message.

If the user decides to delete all the products previously selected, he clicks the empty cart button, sending the message to the *Browser*. The *Browser* sends a message to the *WebServer* who is in charge of executing the deleting action and return a confirmation message.

When the user is ready to proceed with the payment, notifies the *Browser* who asks to the *WebServer* for the customer information form. After the *WebServer* returns the form, the *Browser* displays it. The next step to continue with the payment is wait for the user to fill out the form with his personal and bank information. When the user submits his information, this is sent to the *WebServer* who asks the *DataServer* to return the customer information in order to verify it. After verifying the customer information, the *WebServer* sends it to a *ExternalBankService* who is in charge of authorize the payment. Finally, after the *WebServer* receives the confirmation from the *ExternalBankService*, sends a confirmation message to the *Browser*

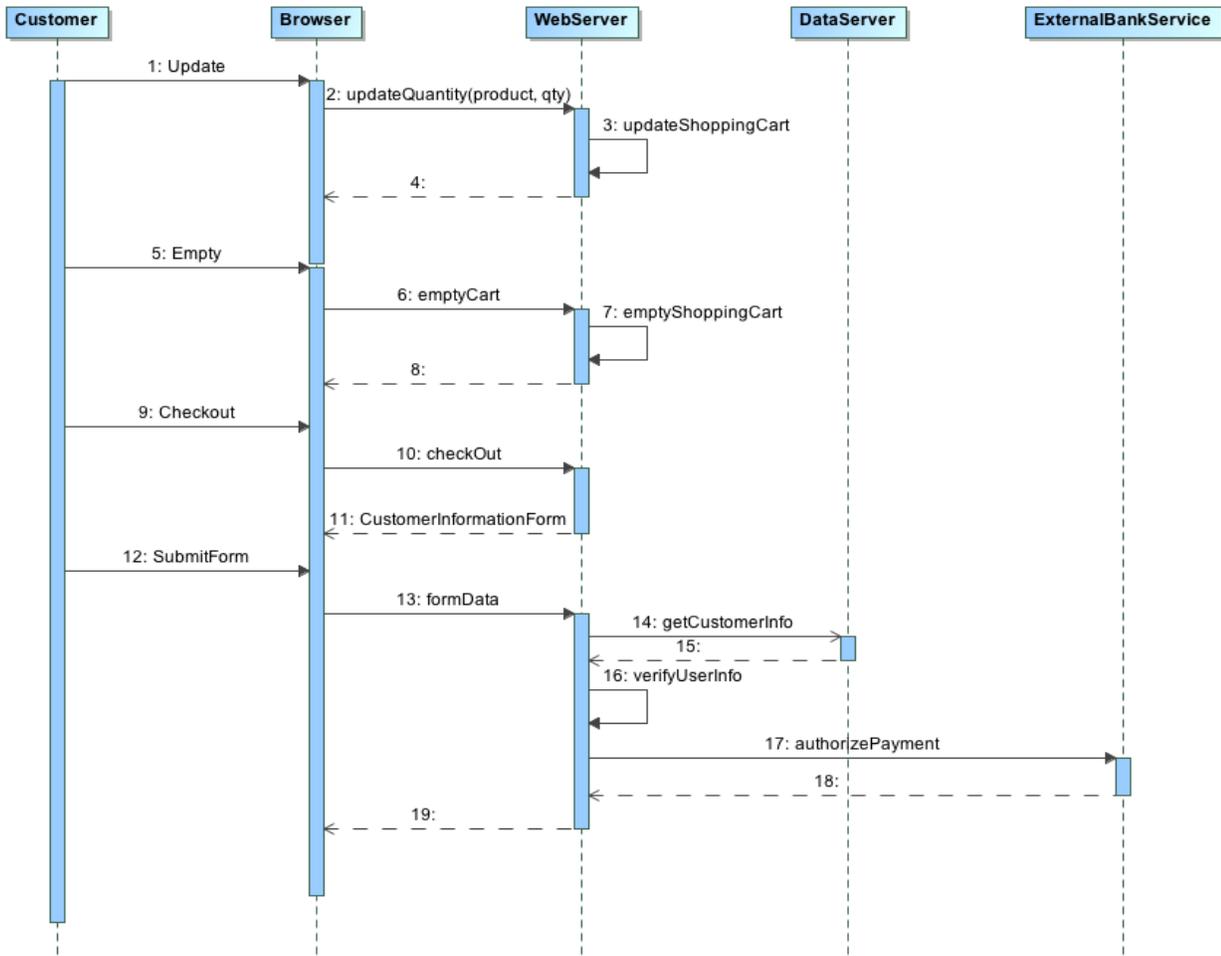


Figure 19: Sequence Diagram of the Online Bookstore

Additional diagrams can be used to describe the deployment of the components and other aspects, as shown in Figure 20.

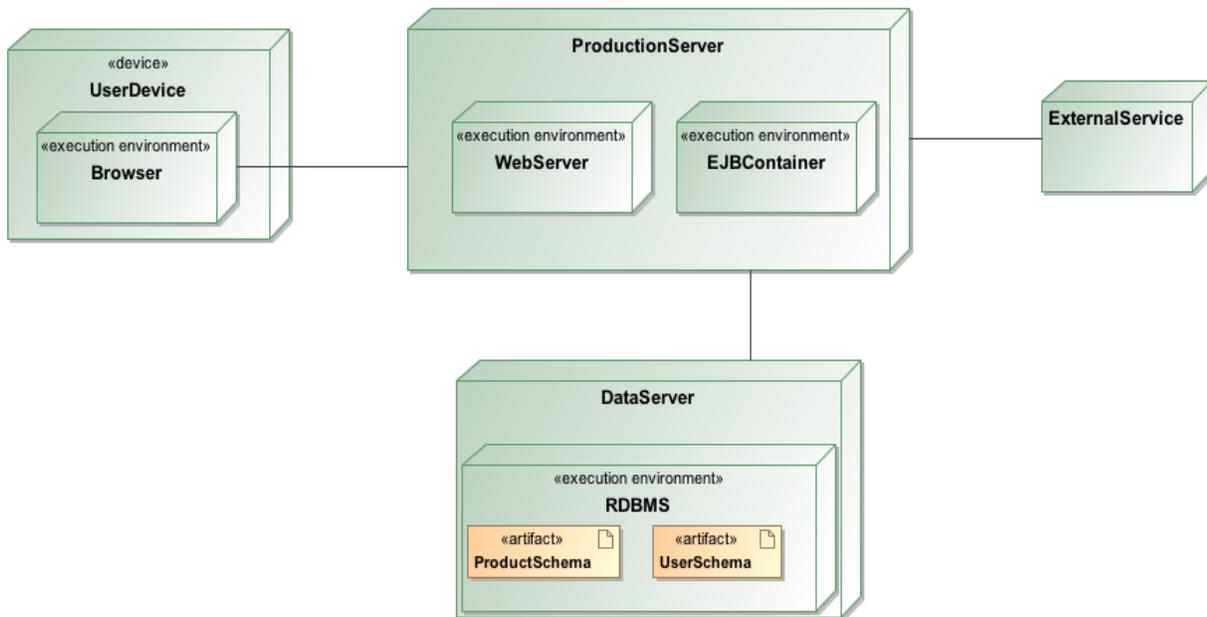


Figure 20: Deployment Diagram of the Online Bookstore