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ONLINE MOVIE RENTAL STORE APPLICATION

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FOREWORD

I take this opportunity to express my gratitude to all and sundry for the immense help offered to me in achieving this milestone. I admit that this thesis would not have fulfilled its original purpose without the endless assistance of my supervisor Dr. Ghodrat Moghadampour, for his time and patience.

Finally, I would like express my indebtedness to my lovely family (Jayson Dylan Sam, Joyce Sonia Lydi and M.C Anne Lize), and especially to my mother Lydienne Ekollo, for her unquenchable support and love delineated to me during this moment.

Vaasa 26th, May 2014.

Johb Fritz Ekollo

ABSTRACT

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The purpose of this thesis was to create an Online Movie Rental Store which is a Java web application developed with “Binding Attributes in contexts”, with a built-in Eclipse software environment and MySQL, which is basically organized in a tripartite in terms of functions: films, customers and administrator.

Online Movie Rental Store Application was devised to offer large opportunities to customers, according to the novelty of the movie and according to categories relating to: the name of the movie, the actors’ names, the number of free movies, the release year of the film etc. The customer data are available: customer id, first name, last name, address and phone number.

Furthermore, this application was designed to display detailed information about the products and customers in a specific order. In this manner, the administrator is responsible for all functions related to the management of films and customers. The administrator is, thus, able to add, delete, update, and request information related to films and customers.

This thesis aims at providing variable solutions that allow customers to track innovation in online sales and rentals of movies in an effective way. Accordingly, this project also gives a vision of how to enhance future procedures of movie shopping. On the other hand, using social network, such as Facebook will encourage the simplification of the user registration, and provide an adequate means for accessing movie rental stores.

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1 INTRODUCTION

Even a couple of years ago, movie rental services were carried out in physical structures where customers queued to secure their preferred movies. The advancement of web-based technologies ushered in different approaches to doing business, with online business constituting a predominant trend in our contemporary societies.

Renting movies was no exception to the growth of technology and online marketing. Netflix commenced its online movie rental services in 1997, and has managed to thrive tremendously in recent times, despite facing occasional debilitating forces.^{1/}

An online movie rental store is a virtual platform which offers online users the opportunity to rent movies by browsing an array of available movies. It enables customers to select their preferred movies and make an order online without going to a brick and mortar store.

The selected items will be collated into a shopping cart. At the checkout time, the items in the shopping cart will be presented as an order.

Albeit it remains the most preferable medium of renting movies in most developed economies, some basic information about the customer is required to finalize the transaction. The user is usually required to fill in the billing and shipping addresses, as well as the payment information, in order to complete the transaction. The customer is reminded about the order through an email notification sent to him/her by the rental store.

Commerce, which relates to the buying and selling of commodities in large scale and also involves transportation of these goods, has remained a traction of humanity. People have, throughout history, deployed several ways of doing businesses, from the barter system to the use of money as a medium of exchange.

Until the 20th century, business activities have solely been conducted at physical locations, where seller and buyer have interacted. This type of business interaction, also known as offline commerce, remains the oldest, safest, and the widely practiced business model.

However, globalization makes trade more cosmopolitan, with the introduction of electronic commerce, where buyers and sellers can interact without personal contacts. E-commerce in the 21st century has grown significantly especially in developed countries where the Internet use is prevalent.

An online movie rental is a fantastic way to distract oneself from the monotony of everyday life, and it is especially useful for journeys. She/he is able to rent and stream any movie online without having to visit the physical rental store.

1.1 Background

The brick and mortar model of commerce has remained the safest and traditional form of doing business. This form of commerce creates a locale where people can meet face-to-face to carry out transactions (Wise Geek). While offline commerce seems to be an expensive way of doing business in terms of infrastructure and logistics, it appears that a great percentage of buyers prefer the offline model of doing business./2/

The Internet is believed to have augmented the growth of trade in the 21st century. People are, by the click of a mouse, able to buy and sell products, irrespective of their own location.. This trend has ratcheted the global trade significantly and expedited the transfer of goods and services.

With its backdrop on web applications, the online shopping system helps both sellers and buyers to maximize their utility with fewer resources. With this model, customers are, in the comfort of their own home, able to buy products or services merely by browsing their computers' navigators. They save the time of perambu-

lating in huge shops in search of a particular product. Seemingly, the online shopping system often offers products at lower prices than the brick and mortar.

The brick and mortar enterprises in the computer age have also identified the viability of supplementing their traditional way of doing business with internet marketing. A research shows that online marketing is able to target a larger audience than the traditional approach. The emergence of the hybrid commerce which makes use of both online and brick-and-mortar approaches is, accordingly, noticeable.

1.2 Description

The main objective of this thesis was to create a virtual movie rental store web application corresponding to a shopping process in which the customer interface provides an online store for customers to rent films. The administrative management provides an interface for administrators to manipulate the user interface and products (films) interface by, for example, modifying the layout of the shopping website or editing product information. The database management system is, without a doubt, an inevitable part of the whole rental store system.

In addition, the user's data, which may include customer identifications and rental shopping orders, will be saved in a database system through the connector provided by the administrative module. It must also store and save the edited user- and product information on the database.

After a customer submits his order, the web application based on the shopping system records this information in a database management system. The information management system shall bolster the process by managing it, processing the customer's order, delivering the order to the logistical party, distributing processes, and tracing the payment for financial module.

2 OVERVIEW OF THE PROJECT TOOLS

This thesis project employs variable technologies and tools which comprise Java Server Pages (JSP), Java Language, HyperText Markup Language (HTML), Shopping Cart, MySQL database and phpMyAdmin.

2.1 Description of Tools

In 1999, Sun Microsystems added a new element to the collection of Enterprise Java tools: Java Server Pages (JSP). Java Server Pages are built on top of Java servlets and are designed to increase the possibility for programmers, and non-programmers, to create web content efficiently./3/

In Java Server Page (JSP) is a technology for web application development or the appearance of web pages through the use of servlets, a small program that is specified in the web page and run on the web server to modify the web page before it is sent to the user who requested it.

The Java Server Pages - component is a type of Java servlet that is devised to fulfill the role of a user interface for a Java web application. Also, a JSP source code runs at the web server in a JSP servlet engine, which dynamically generates HTML, XML, etc. and sends output to the client's web browser.

Using JSP, you can collect input from users through web page forms, present records from a database or another source, and create web pages in an animated way. Similarly to Servlets, Java Server Pages are constructed on top of the Java Servlets API. It also has access to all the powerful Enterprise Java APIs, including JDBC, JNDI etc.

2.1.1 Setting Up the JSP Environment

Running a JSP-file requires a JSP-supported web server. Tomcat is a servlet and JSP container developed by the Apache Software Foundation (ASF). Tomcat compiles the Java Servlet and provides a Java-based web server environment for

the Java code to run. Although Tomcat is developed by the Apache organization and has the superior supports from SUN Microsystems that develops J2EE, it tends to experience some anomalies with EJB applications.

2.1.2 Generating Dynamic Content

JSP offers an array of tools which pertain to the generating of dynamic content: content that differs based on user input, time of day, the state of an external system, or other runtime conditions.

- Creating a JSP page
- Installing a JSP page
- Running a JSP page

2.2 HTML Overview

HTML stands for HyperText Markup Language, and is the most widely used language designed for writing Web Pages. In 1989, Tim Berners-Lee invented the Web with HTML as its publishing language.

As the name suggests, HTML is a Markup language. Originally, HTML was developed with the intent of defining the structure of documents, such as headings, paragraphs, lists, etc to facilitate the sharing of scientific information between researchers./4/

2.3 Java Overview

Java is a programming language that was invented by James Gosling in 1994. It was originally named Oak and was developed as part of the Green project at Sun Company. The writing of Java codes for programming began in December 1990. Java is a programming language and environment that was created to resolve a number of problems in modern programming practice. It commenced as a part of a larger project to develop advanced software for consumer electronics. These are small, reliable, portable, as well as distributed real-time embedded systems.

Initially these were just compiler technology problems, but as time passed it encountered a set of anomalies that were best remedied by changing the language./5/

2.4 MySQL Database

MySQL is a cross-platform open source Relational Database Management System (RDBMS). It was created by Michael Widenius, who partly named it after his daughter, My. It was initially released on the 23rd of May, 1995 under the GPL License. It was originally owned by a Swedish firm, MySQL Ab, which is now owned by Oracle./6/

2.5 PhpMyAdmin

PhpMyAdmin is a free and open source GUI tool written in PHP, which is used for web database administration. It has cross-platform support for the major operating systems and was first released in 1998 under the GNU General Public License.

It has an intuitive web interface, and is compatible with many MySQL features. It also has data management (including import and export) support for many formats like CSV, SQL, PDF, XML, among others./7/

3 DESCRIPTION OF ONLINE MOVIE RENTAL STORE APPLICATION

Below a detailed description will be the given of the project, the requirements, objectives and the constraints.

3.1 Background

Online movie rental store based on web application is a virtual platform which can be visualized as a bipartite in terms of interface: administrator interface and customer interface.

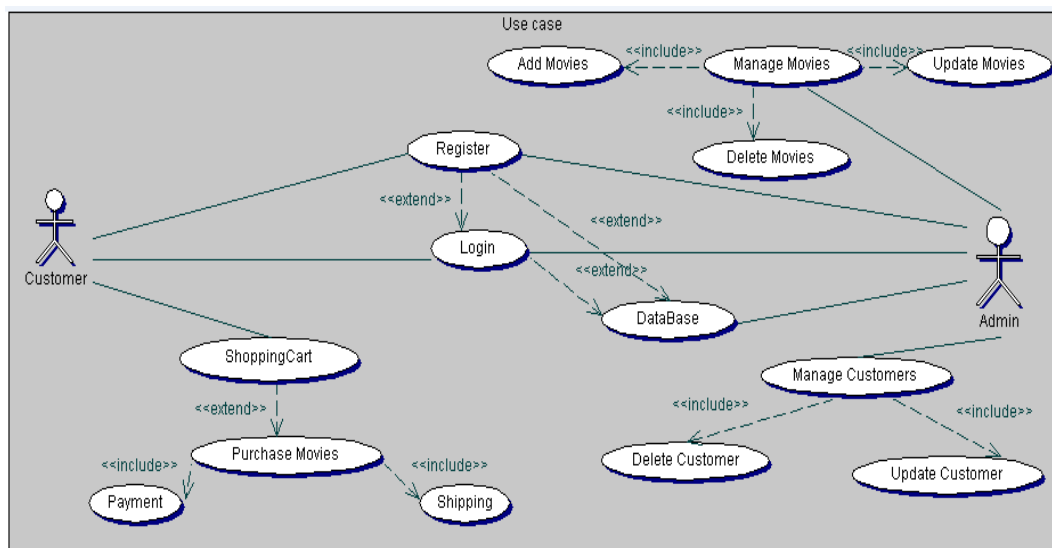


Figure 1. UML's Configuration Diagram Architecture

3.1.1 Functional Objective

The Online Rental Movie Store is divided into two fragments in terms of roles: a background for the administrator and a user's interface for customers. In this sense, it becomes imperative to elucidate the corresponding functions included in these fragments.

3.1.2 Log In

The administrative management process in the prototype of the administrative module includes the following steps:

- Administrator login properties:

- Username
- Password

When connected to the background management platform "url", an administrator's log in- page should be displayed and request a username and password, in order for the administrator to view the management pages. The original username and password are pre-set on the database that is registered for administrators.

3.2 Foreground Administrator Pages

As mentioned earlier, the administrative management provides an interface for administrators to manipulate the customer interface and products (films) interface.

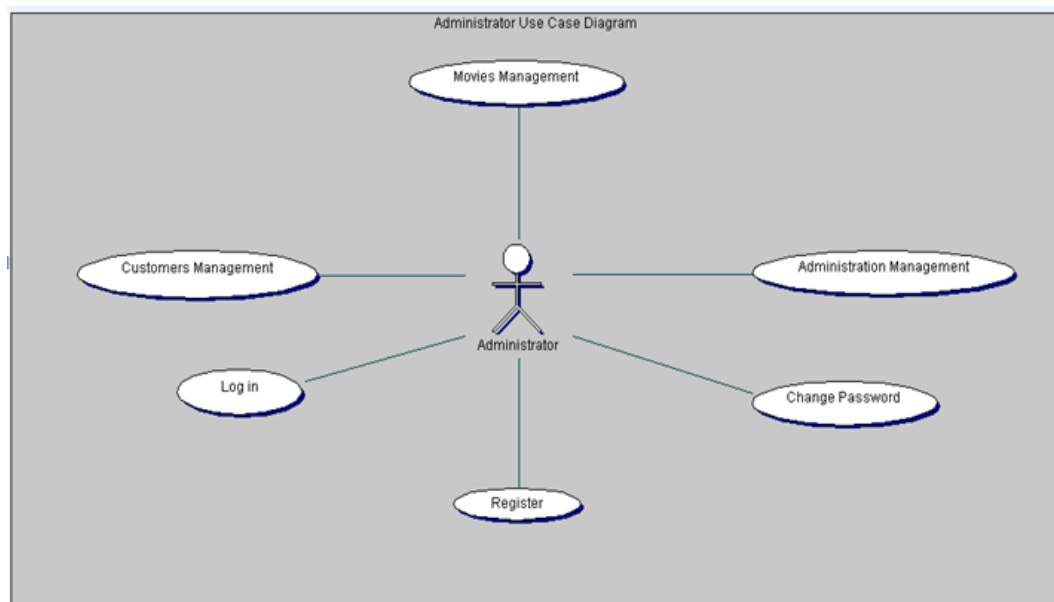


Figure 2. UML's Diagram for Administrator case

3.2.1 Admin Management

The administrator login properties:

- Username
- Password

Subsequently, after clicking the link “Management Space”, the user will have a preview of an admin list which shows all administrators’ properties. The priority administrator can delete roles by clicking the link “Delete Customer” or add film to the system by clicking the link “Add Movie”. Administrators are defined as system-admins who have the authority to manage the products catalog (films) and customers.

3.2.2 Movies Management

Movies management properties:

- Add Movie
- Delete Movie
- Update Movie

A list of the Movies Function Management-exhibiting properties of Movies management will be displayed after the user clicks “Movies Management”. The administrator can add, delete and update movies by clicking the link corresponding to each property's function.

3.2.3 Customers Management

Customers management properties:

- Delete Customer
- Update Customer

After a click on the link “Customers Management”, a menu of Customer functions management will be displayed and these will give you an idea about the properties of movie management. The administrator can delete and update customers by clicking the link corresponding to the function of each property.

3.3 Foreground Customer Pages

As mentioned earlier, Customer Interface provides for the customers a virtual online movie store web application to rent products (films).

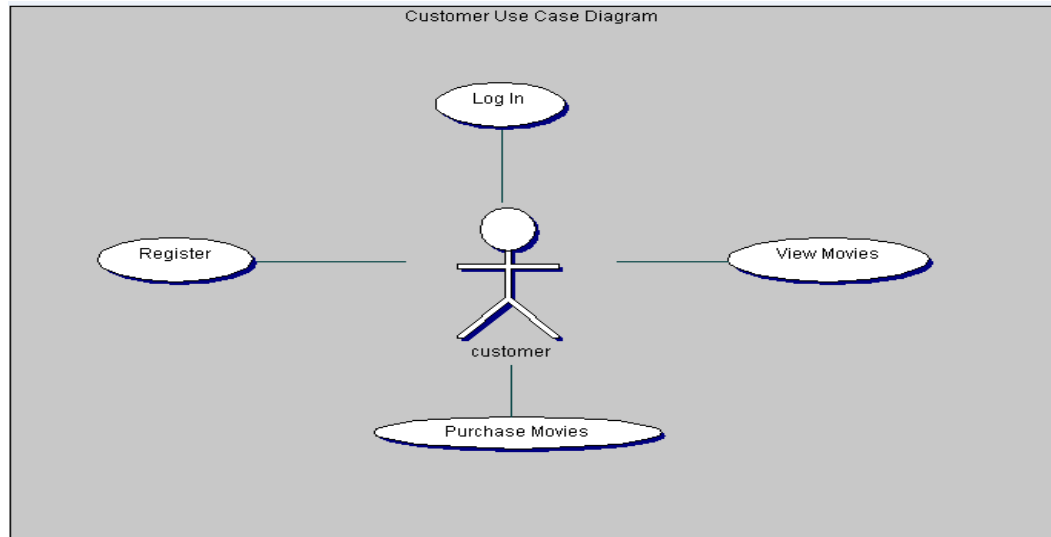


Figure 3. Use UML's diagram for user case

3.3.1 View Movies

The Customer Interface provides a homepage for the shopping page. The only item consists of the movie shopping catalog. Movies are viewed through the page that lists available movies; this page displays a table including the movie title, description, actor's name, length, release year, rental duration and price.

Furthermore, the customer's check-out shopping cart that displays the check-out choices of the movie shopping orders is displayed not only after the product webpage but also in the item homepage after the customer has completed his/her order.

3.4 Shopping Cart Application

The objective of this application is to provide the users with an online virtual store where they can rent movies from the comfort of their home. A shopping cart is

appropriated for this purpose. The user can select the desired movies and, gather them in the shopping cart, and pay for them with a credit card. The user's order will be shipped according to the type of shipping selected in the order. Therefore, it should be made noticeable that the Online Movie Rental store application requires some fundamental steps to enable the user's purchases. These processes include:

- Registration
- Login
- Menu (Films Catalog)
- Shopping Cart
- Checkout
- Final Order
- Purchase History

3.4.1 User Registration

Similarly to other online retailers, every shopper will be requested to create a user name and password before making a purchase. This will be used during the ordering phase and is saved on the database, to be used for future purchases. As a mandate, the creation of online identification requires the potential customer to fill out an online customer registration form. This form usually demands detailed information from the prospective buyer.

Momentarily, the user's data, such as the customer identification, is stored and saved on the database system through the connector provided by the administrative management. That information helps customers when they have to login and purchase films.

3.4.2 Shopping Cart Interface

After a customer has browsed through the catalog and identified interesting movies, he/she is able to rent them by firstly adding these movies into the basket (cart). This action takes place by clicking the "Add to Cart"-button.

All the information in the shopping cart is stored in the "Shopping Cart" table contained in the database (PhpMyAdmin). Adding a movie into the shopping cart does not make the movie unavailable to others, as that happens only after the order has been placed. So, putting in the movie in the shopping cart does not guarantee the availability of the movie at the time of placing the order.

3.4.3 Purchase and Transaction History

After the user has navigated the Online Rental Movie Store's catalog and used his shopping cart, he will be obliged to enter the credit card information to fulfill of his financial commitment.

The other side, the shipping address is obtained from the Customer table via the database (PhpMyAdmin). The user is also asked to select the desired type of shipping for the order. When all the information is entered, the user can "Proceed to the Checkout".

Before finalizing the ordering process, the application shows the total price of the order, which includes the quantity of the movies selected, the total price of movies selected and the shipping rate. If the user is not satisfied with the order, the order can be cancelled at this stage. The information in the shopping cart remains intact, so the user can go back to it and make changes if necessary. When the "Place Order" button is clicked, the order is placed and a screen appears which informs the user about the approximate number of days in which the order will be delivered.

3.5 Application Main Connecting Blocks

Below the diagram shows the declarations of each parameter in the different classes. It shows the connections, and the connectivity between the classes. It shows how each class is programmed. It shows that once the user is registered, the data are saved on the database which will help in the start-up and prompting the login.

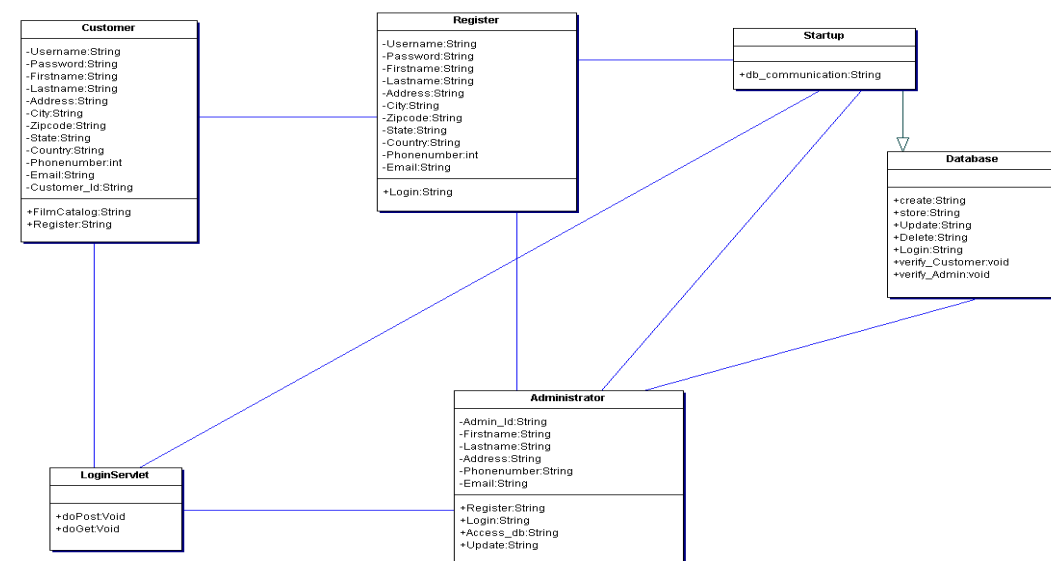


Figure 4. Application Main Connecting Blocks

3.5.1 Application Customer Registration Function

This step shows what happened in each class. The new customer has to first create an account by registering. In this fact, "customerregistration.java" file is responsible to save the customer information on the database (phpMyAdmin) with using DriverManager.

Once the registration is successfully completed, the customer will be able to login into the application with the help of "Login.java" file.

The registration sequence is explained diagrammatically. The user fills in all the required fields on the form and submits. The customer's information will be saved automatically in the database but if any of the fields is empty, the application sends an error message and returns to the customer register page where the cus-

tomer is supposed to complete all the fields form. In this step, "CustomerRegistration.java" file is responsible for storing the customer information into the database from the servlet called "registration".

When all the required fields have been filled and accepted or saved in the database, the customer login page will open which will prompt the customer to enter the registered username and password.

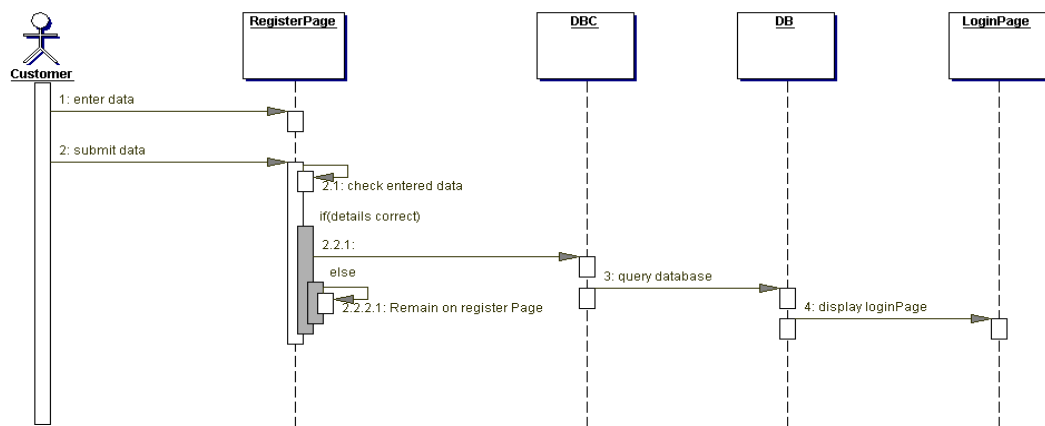


Figure 5. Application Customer Registration Function

3.5.2 Application Customer Login Function

In this step, two login checks are allowed to verify customer information which will course the database to check if the customer has already registered and validate checking by a response message. When the parameters are accepted, the application main page will be displayed.

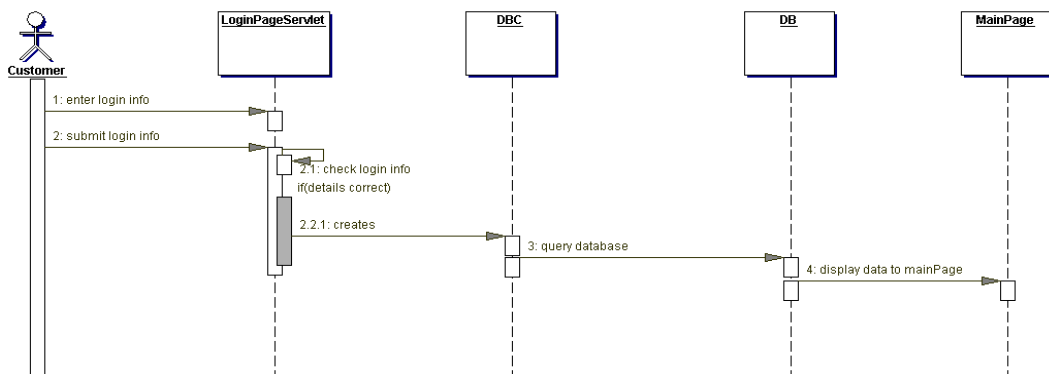


Figure 6. Application Customer Login Function

This diagram illustrates the sequence of customer login into the application. When the customer fills the username, password and click submit button. The login servlet checks the entered data and queries on the database. When this is confirmed and logged in, the main page will be displayed, which contains Films Catalog available.

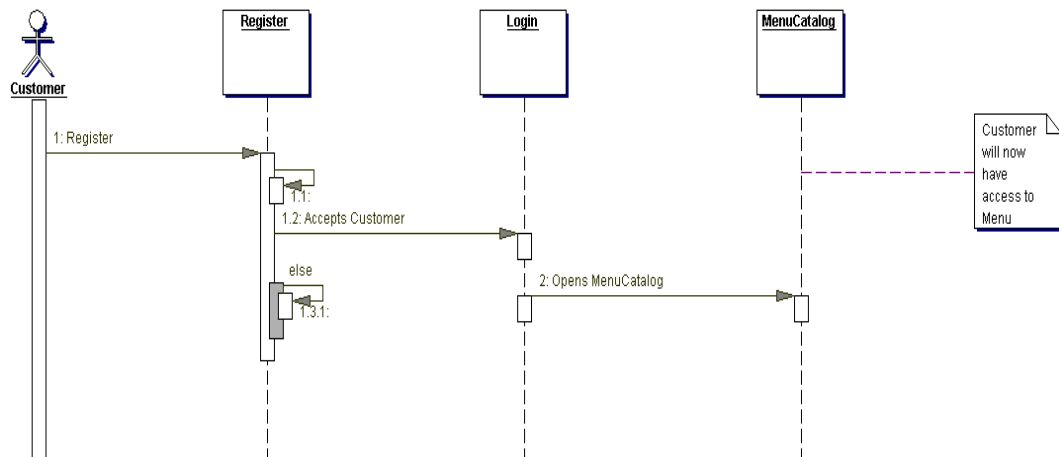


Figure 7. Application Customer Function Diagram

3.5.3 Application Administrator Registration and Login Function

In this phase, the registration mechanism follows the steps as already mentioned earlier for Application Customer Registration Function.

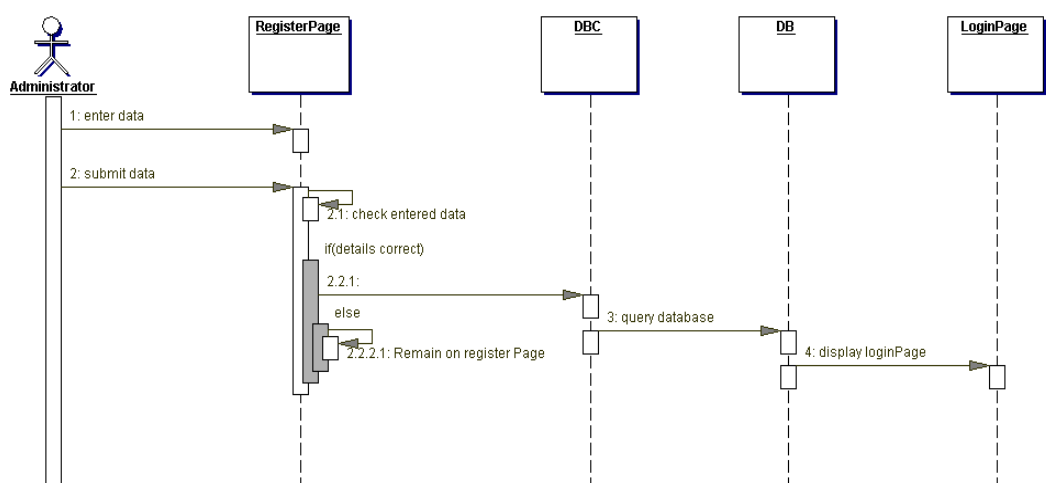


Figure 8. Application Administrator Registration Function

Some differences can be seen in Figures 8 and 9 for files "AdministratorRegistration.java" responsible to store administrator information into the database from the servlet called "register" and "LoginAdmin.java" responsible to Administration login into the application.

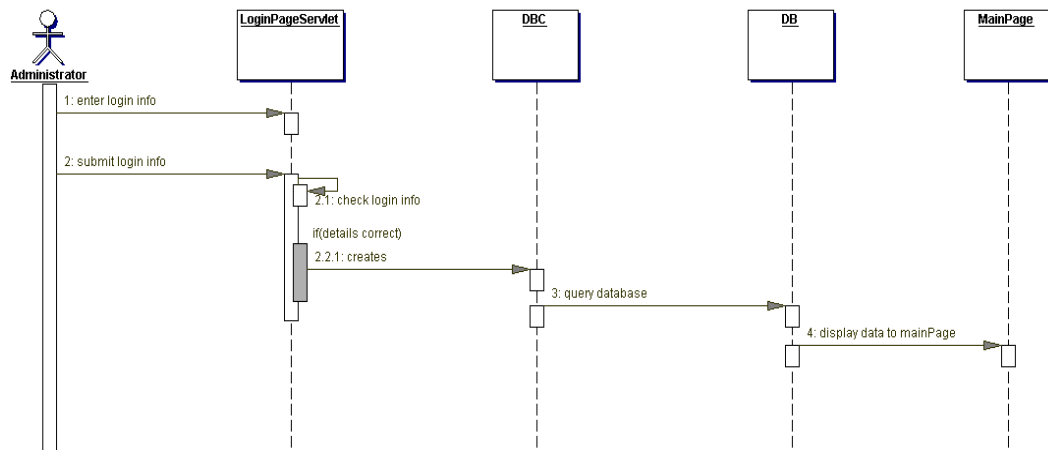


Figure 9. Application Administrator Login Function Diagram

The registration and login are still the same as earlier. Respectively, when the administrator information (username and password) are confirmed and logged in, the main page will be displayed, which contains management application service (customers, movies and database).

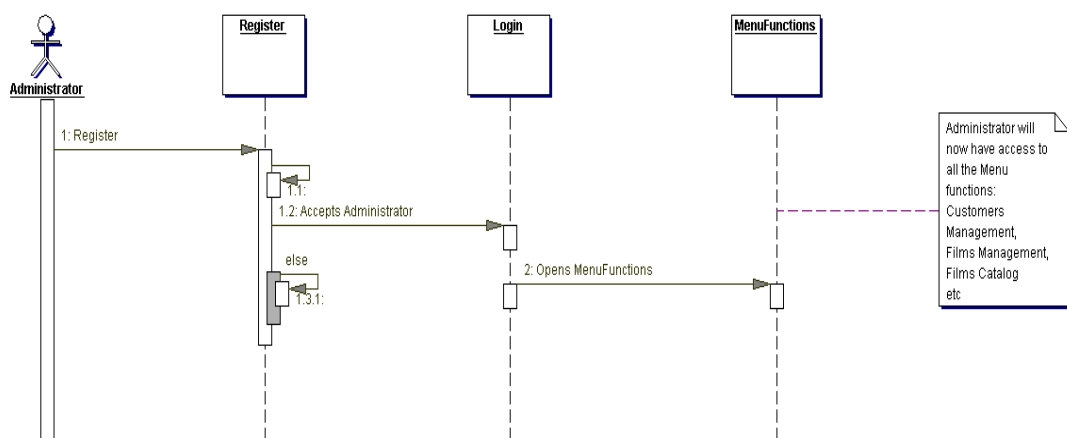


Figure 10. Application Administrator Function Diagram

3.6 View Module of Movie Online Shopping Cart Application

The Online Movie Rental Store is a "Binding Attributes in contexts" project which makes full use of classical concept known as MVC, short for model, view and controller. The inside structure will be analyzed precisely in the following.

3.6.1 View Module of Movie Online Shopping Cart

Diagram illustrates the Model module, View module, and Controller module, the connections between the modules, and the back-end database support as well.

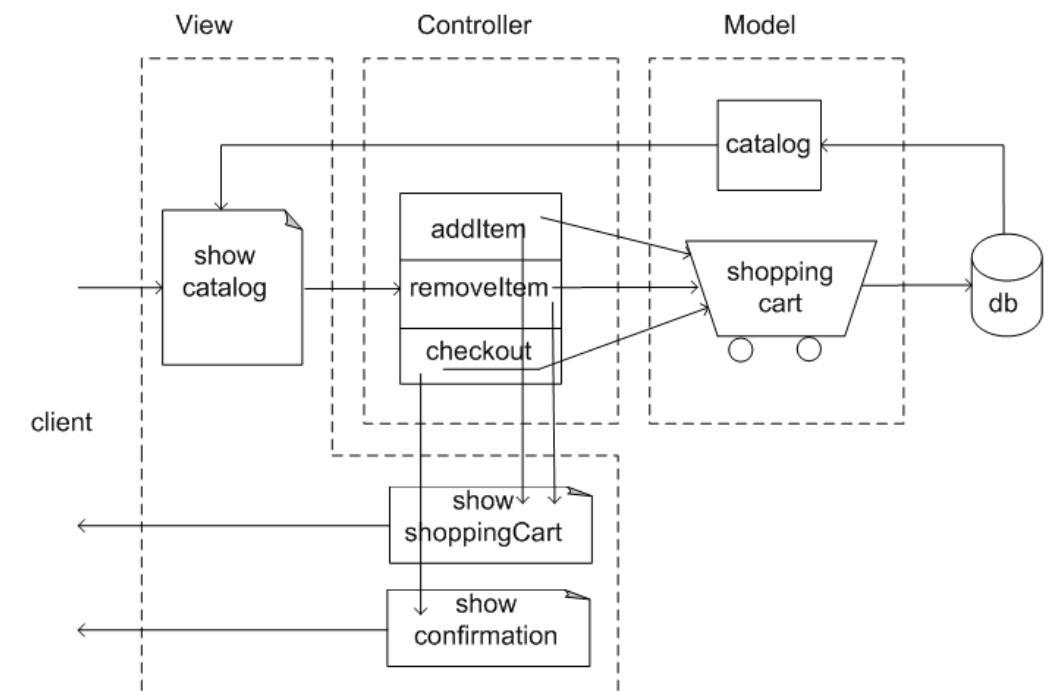


Figure 11. MVC of Movie Online Shopping Cart Application

This step shows MVC logic (View module) which has the following functionalities:

- enabling customer browsing of the films catalog
- selecting the items and adding them to the shopping cart
- deleting items from the shopping cart
- displaying the shopping cart contents

- checking out

3.6.2 Application MVC Architecture

This application is divided into three different blocks which (have several classes) are the Controller, View and the Model. The controller holds the registration; the customer is the view (client) and the model is the administration. These classes are the foundation of this application. After the customer or administrator has registered, he or she will be able to login into the application after the application has received the response from the database by the server to confirm information provided by the customer or administrator registration from the customer table or administrator table. The figure below shows the framework.

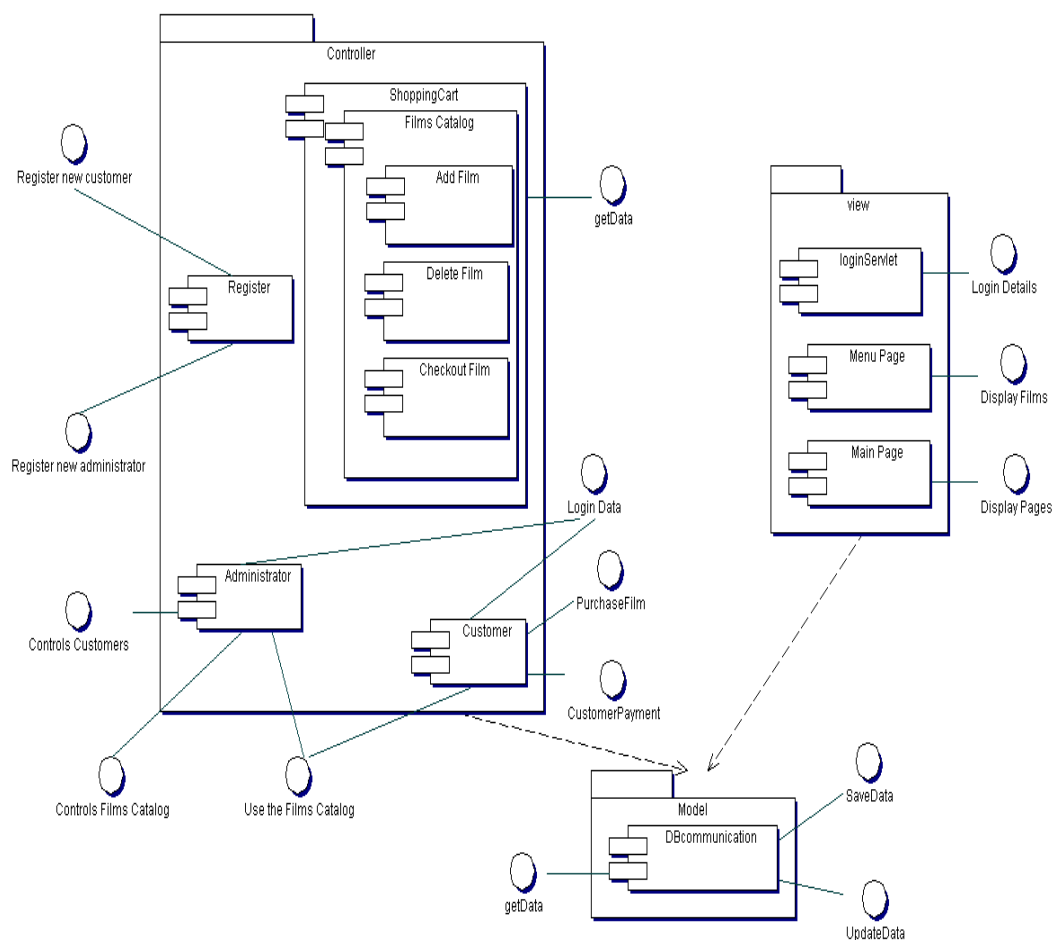


Figure 12. Application MVC Architecture Diagram

3.6.3 Online Movie Rental Store Working Diagram

The diagram below shows what happens in each step of the application and how the application works based on the online shopping cart system. The customer needs to register and all the data will be saved on the database where the customer can still retrieve and use it in its purchases. After the registration is successful, the customer is logged in with the same username and password created. After the login is done, the films catalog appears so that the customer may make purchases.

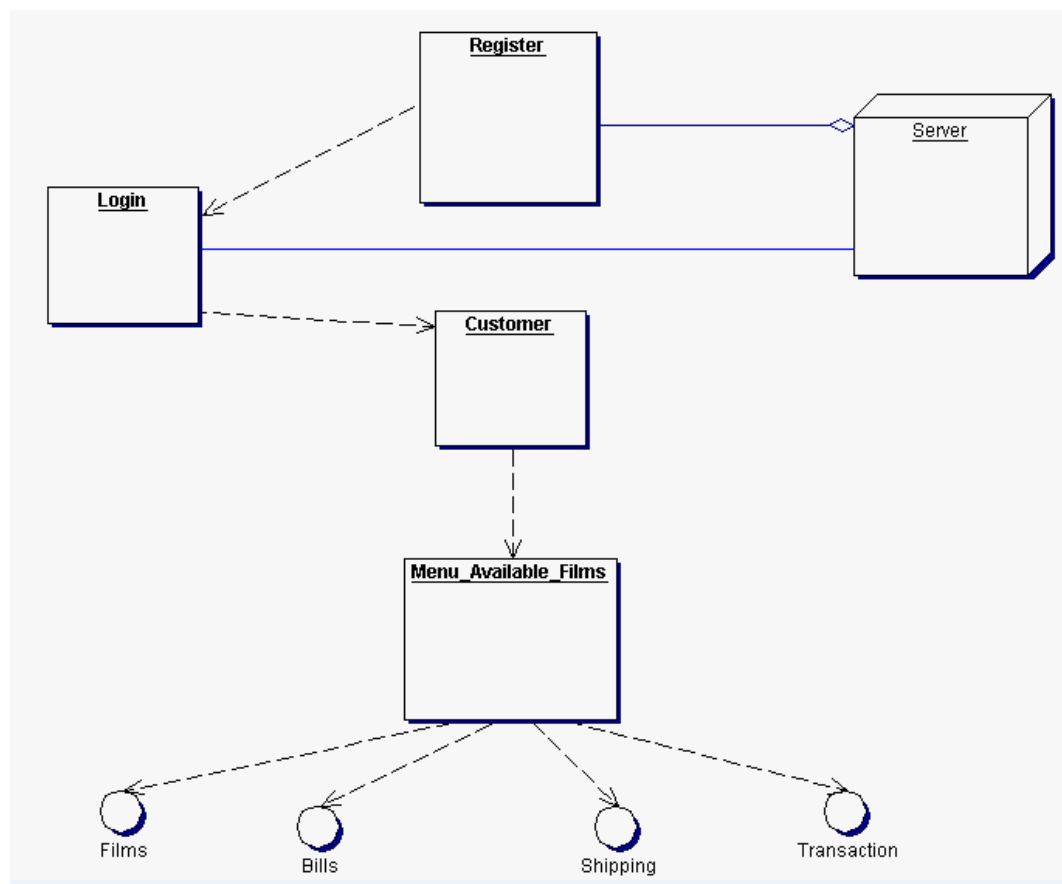


Figure 13. Online Movie Rental Store Working Diagram

4 DATABASE AND GUI DESIGN

The chapter deals with the database and GUI design.

4.1 Database Design

The database for the project was created using MySQL based on the requirements listed in chapter 3.2.

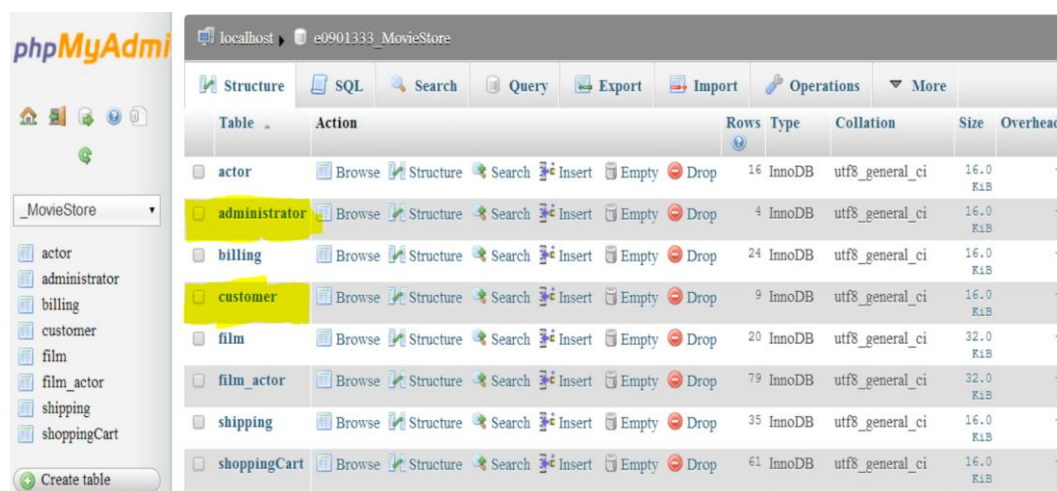


Table	Action	Rows	Type	Collation	Size	Overhead
actor	Browse Structure Search Insert Empty Drop	16	InnoDB	utf8_general_ci	16.0 K1B	-
administrator	Browse Structure Search Insert Empty Drop	4	InnoDB	utf8_general_ci	16.0 K1B	-
billing	Browse Structure Search Insert Empty Drop	24	InnoDB	utf8_general_ci	16.0 K1B	-
customer	Browse Structure Search Insert Empty Drop	9	InnoDB	utf8_general_ci	16.0 K1B	-
film	Browse Structure Search Insert Empty Drop	20	InnoDB	utf8_general_ci	32.0 K1B	-
film_actor	Browse Structure Search Insert Empty Drop	79	InnoDB	utf8_general_ci	32.0 K1B	-
shipping	Browse Structure Search Insert Empty Drop	35	InnoDB	utf8_general_ci	16.0 K1B	-
shoppingCart	Browse Structure Search Insert Empty Drop	61	InnoDB	utf8_general_ci	16.0 K1B	-

Figure 14. phpMyAdmin interface on the server

Next the database was used to store and to save all the information entered in the register page, which the user can later access through different operations (such as login, bill payment or tracking package or customer management or film management...) as well for future use. The database structure in MySQL shows administrator and customer tables.

```
CREATE TABLE IF NOT EXISTS `administrator` (
  `admin_id` int(10) unsigned NOT NULL AUTO_INCREMENT,
  `firstname` varchar(25) NOT NULL,
  `lastname` varchar(25) NOT NULL,
  `username` varchar(20) NOT NULL,
  `password` varchar(20) NOT NULL,
  `phonenumber` varchar(20) NOT NULL,
  `email` varchar(30) DEFAULT NULL,
  `last_update` timestamp NOT NULL DEFAULT CURRENT_TIMESTAMP ON UPDATE CURRENT_TIMESTAMP,
```

```
PRIMARY KEY (`admin_id`)  
) ENGINE=InnoDB DEFAULT CHARSET=utf8 AUTO_INCREMENT=2909978124 ;  
  
CREATE TABLE IF NOT EXISTS `customer` (  
  `customer_id` int(10) unsigned NOT NULL AUTO_INCREMENT,  
  `firstname` varchar(25) NOT NULL,  
  `lastname` varchar(25) NOT NULL,  
  `username` varchar(25) NOT NULL,  
  `password` varchar(30) NOT NULL,  
  `address` varchar(30) NOT NULL,  
  `city` varchar(20) NOT NULL,  
  `zipcode` varchar(20) NOT NULL,  
  `state` varchar(20) NOT NULL,  
  `country` varchar(20) NOT NULL,  
  `phonenumber` varchar(20) NOT NULL,  
  `email` varchar(30) NOT NULL,  
  `last_update` timestamp NOT NULL DEFAULT CURRENT_TIMESTAMP ON UP-  
DATE CURRENT_TIMESTAMP,  
  PRIMARY KEY (`customer_id`)  
) ENGINE=InnoDB DEFAULT CHARSET=utf8 AUTO_INCREMENT=69 ;
```

Snippet 1. Database MySQL design Diagram

The Java files are communicated to the database by a DriverManager linking from "com.mysql.jdbc.Driver". Thus, information exchanges take place via the server which connects the servlet to the database. The figure below illustrates the actual pattern of this set of operations.

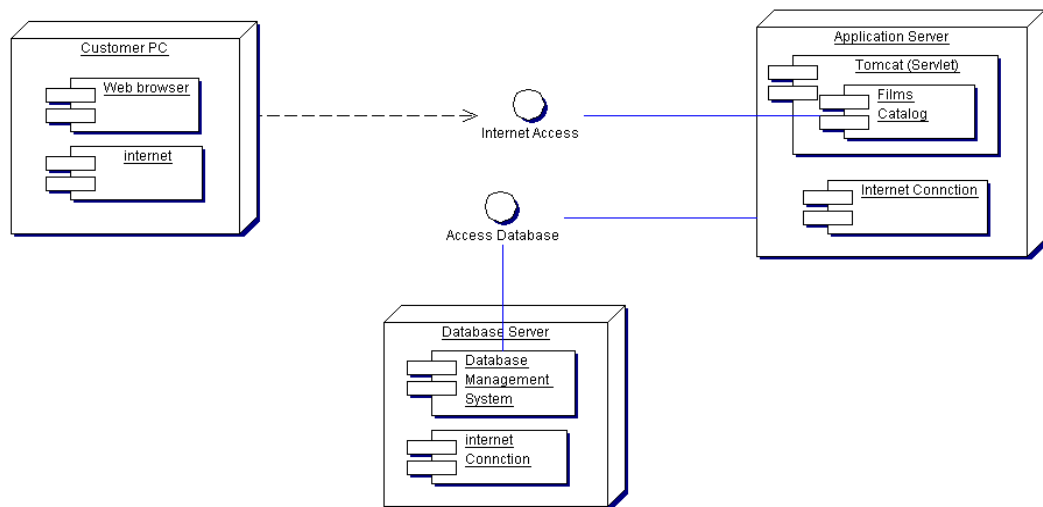


Figure 15. Deployment diagram

4.2 GUI Design

The Online Rental Movie Store is divided into two parts in terms of roles, background for administrator and user's interface for customers. The functions corresponding to each role will be introduced in more detail in the following.

4.2.1 Background of GUI Design

- Register Page

The register page was designed using html. Each of the input fields offer a type personal contact information. So, the register page is linked to CustomerRegistration.java which is connected to phpMyAdmin (database) via the DriverManager.

Figure 16. Register customer page

The login page was designed using login.html. It allows the customer to enter their registered parameters Username and Password.

Figure 17. Login customer interface

The login page is linked to database by Login.java where the customer information has been stored and saved, which file is working together with FirstLoginCheck.java and LastLoginCheck.java files. Their role of is to check and validate parameters into login page.

- Login Confirmation

When parameters are corrects and validated, the customer receives an answer, as a confirmation message from LastLoginCheck.java telling that his or her data filled into the login page have been approved and permission to purchase movies.

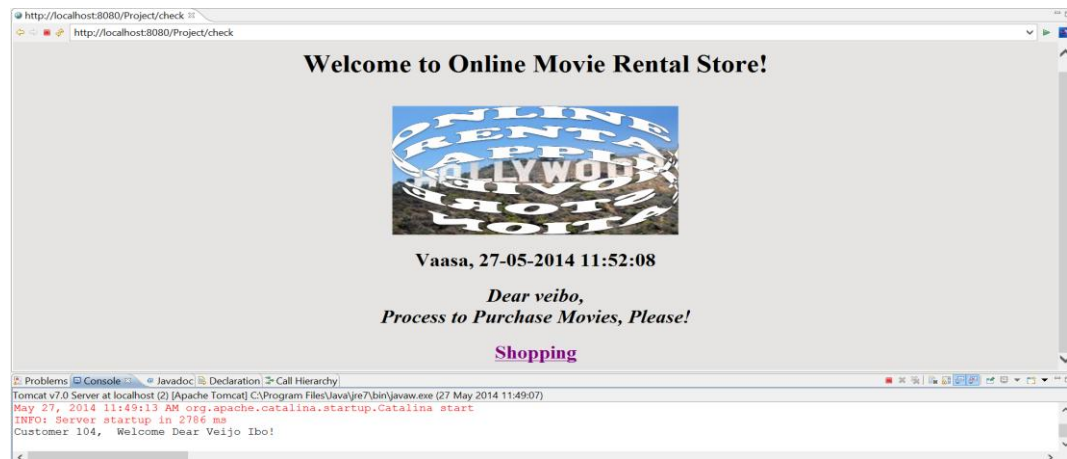


Figure 18. Login successful for customer-page

- Purchase films

At this stage, FilmCatalog.jsp file and Products.java are linked and working together. So, the customer is allowed to purchase films according to his or her interest. The notification is displayed to remind the customer about films purchased.

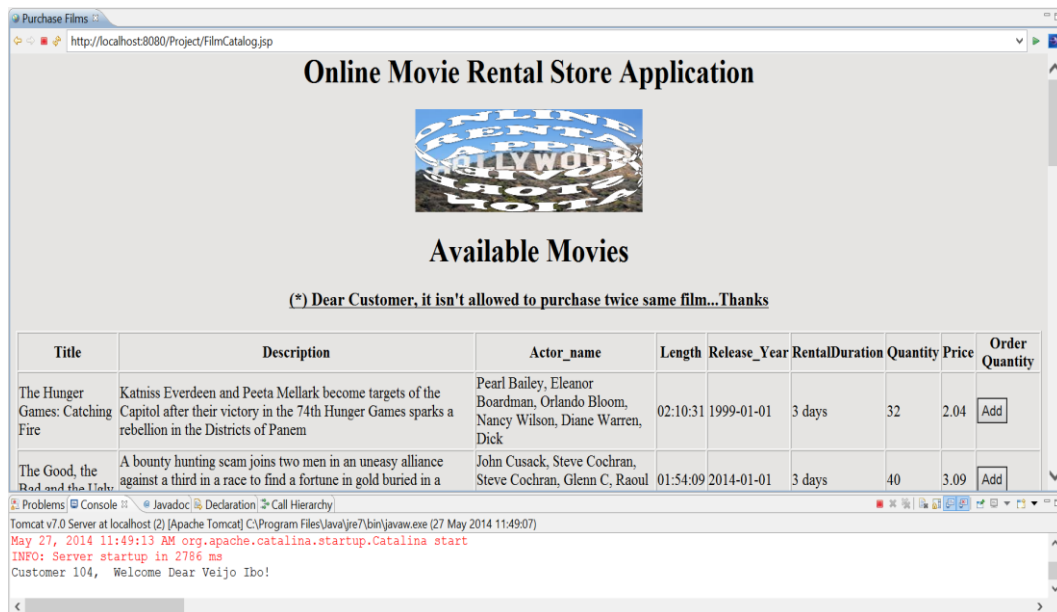


Figure 19. Purchase Films

The DisplayItem.jsp and ConfirmationOrder.jsp are responsible for collecting the number of films after the check-out is made, calculating total films and total amount of rental films into your basket. Those JSP files are linked to ShoppingCart.java, AddItem.java, DeleteItem.java and CheckoutItem.java to achieve this operation. The customer receives a summary of operation made during the purchasing and bill payment.

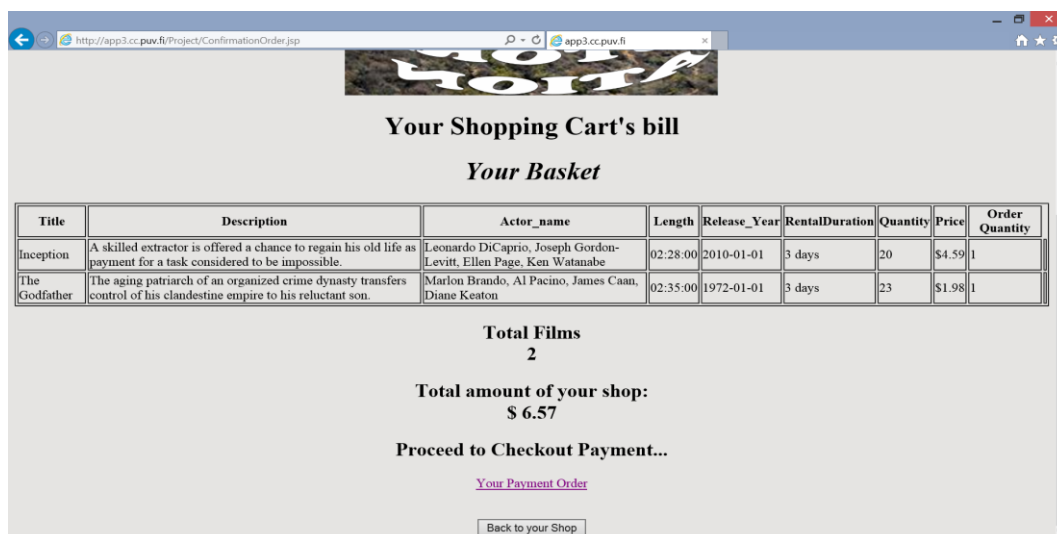
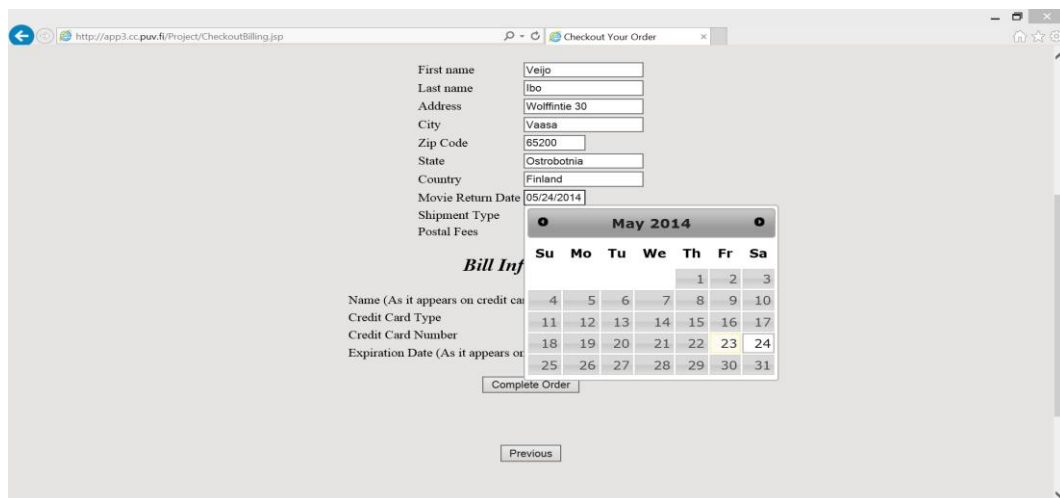


Figure 20. The customer's bill

The customer has to fill some parameters into the customer account page related to shipment information. CheckoutBilling.jsp file is responsible for handling this operation. But, it is linked to CheckoutBilling.java and Login.java (by getting customer data from database), to achieve this operation. So, the field (Movie return date) is using Application of jQuery UI #datepicker.



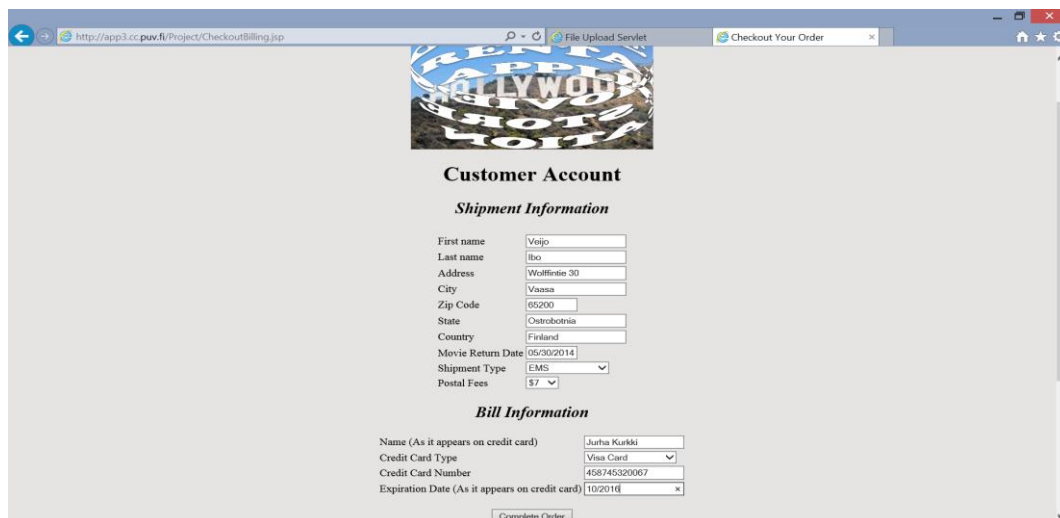
The screenshot shows a web browser window with the URL `http://app3.cc.puv.fi/Project/CheckoutBilling.jsp`. The page title is "Checkout Your Order". The form contains the following fields:

- First name: Veijo
- Last name: Ibo
- Address: Wolffintie 30
- City: Vaasa
- Zip Code: 65200
- State: Ostrobothnia
- Country: Finland
- Movie Return Date: 05/24/2014
- Shipment Type: [Dropdown]
- Postal Fees: [Dropdown]

A date picker calendar is open, showing the month of May 2014. The calendar has a grid with days of the week (Su, Mo, Tu, We, Th, Fr, Sa) and dates from 1 to 31. The date 24 is selected. Below the calendar, there is a "Complete Order" button and a "Previous" button.

Figure 21. The customer's payment

The bank information in the bill form. Another point, the customer must comply with to respect the movie return date, according to the rental duration limited in following three days.



The screenshot shows the same web browser window, but now displaying the "Customer Account" page. The page has a header with a "HOLLYWOOD" logo. The form is divided into two sections:

- Shipment Information:**
 - First name: Veijo
 - Last name: Ibo
 - Address: Wolffintie 30
 - City: Vaasa
 - Zip Code: 65200
 - State: Ostrobothnia
 - Country: Finland
 - Movie Return Date: 05/30/2014
 - Shipment Type: EMS
 - Postal Fees: \$7
- Bill Information:**
 - Name (As it appears on credit card): Juhka Kurkku
 - Credit Card Type: Visa Card
 - Credit Card Number: 456745320067
 - Expiration Date (As it appears on credit card): 10/2016

At the bottom of the form, there is a "Complete Order" button.

Figure 22. Final customer payment

After completing and submitting the information, the customer receives the transaction history which includes the tracking number which is the confirmation of this rental operation. In this step, Logout.jsp and join_email.jsp files are responsible for handling this page. Those files are linked to Logout.java, AddtoEmail.java, ConnectionPool.java, SaveCookie.java and MailUtil.java for performing and completing this step.

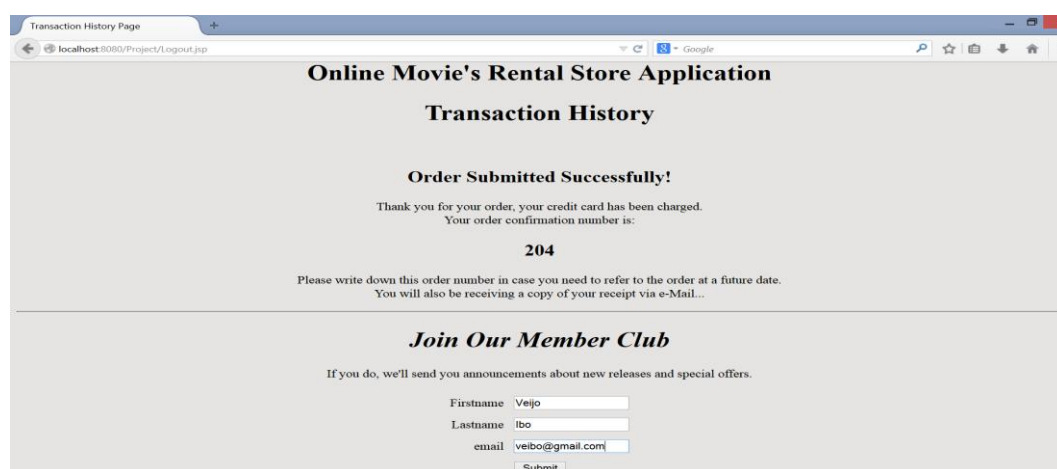


Figure 23. Transaction History

4.2.2 Foreground of GUI Design

In this step, we focused more attention on the administrator management duties. As said earlier, the administrator is responsible for this project in terms of roles: film management (add film, delete film and update film) and customer management (update customer and delete customer).

- Register Administrator Page

As Online Shopping System is based on web application, the administrator has to register and get access into the application. The register page was designed using html. Each of the input fields offers a type personal contact information.

So, the register administrator page is linked to AdministratorRegistration.java which is connected to phpMyAdmin (database) via a DriverManager, to store and save administrator data.

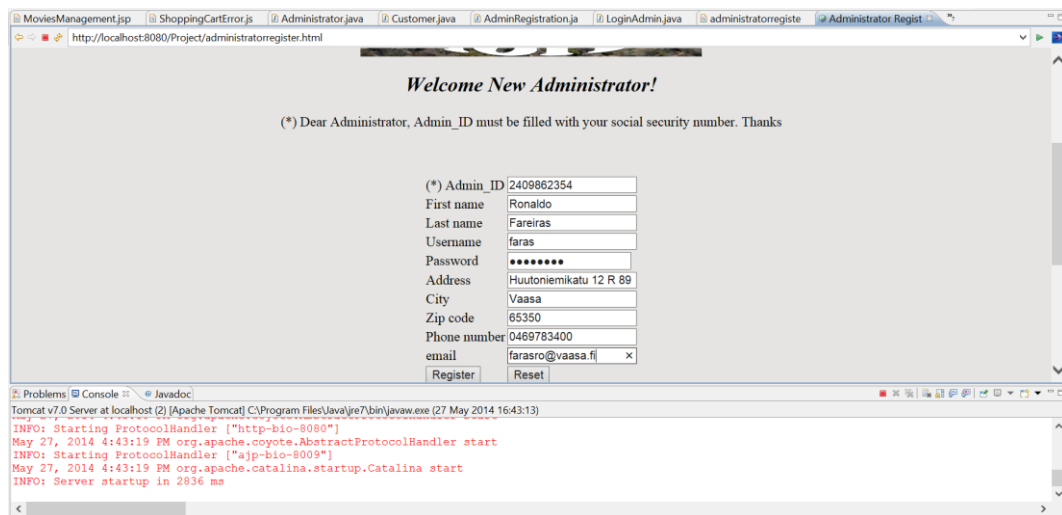


Figure 24. Administrator registration page

The login page is linked to database by the Java file LoginAdmin.java where the administrator data have been stored and saved, which file is working together with others files FirstLoginCheckAdmin.java and LastLoginCheckAdmin.java. Their role of is to check and validate parameters into the login page.

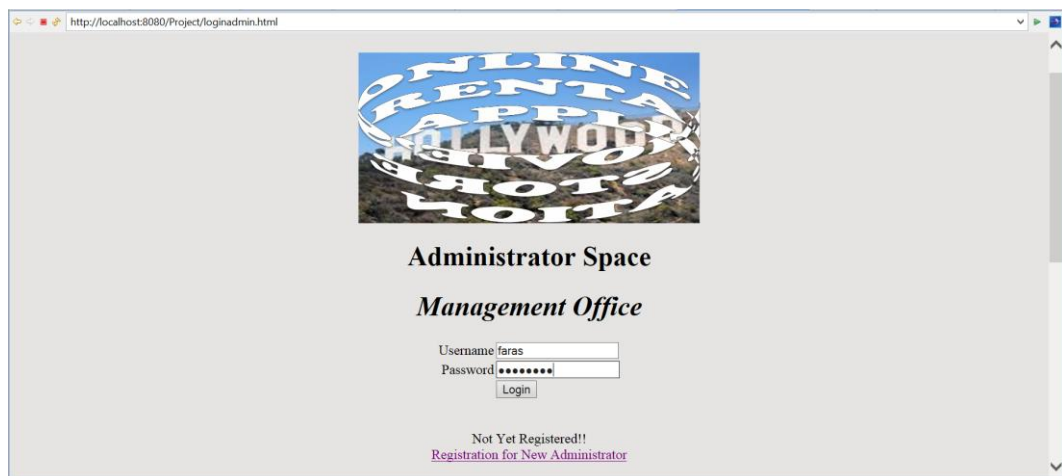


Figure 25. Administrator login interface

The login administrator interface is linked to the database by Login.java file where the administrator information have been stored and saved, which file is working together with FirstLoginCheckAdmin.java and LastLoginCheckAdmin.java files. Their role of is to check and validate parameters into login page.

- Login Confirmation

When parameters are correct and validated, the administrator receives an answer as a confirmation message from LastLoginCheckAdmin.java telling that his or her data filled into the login page have been approved and permission to get access administrator management interface.

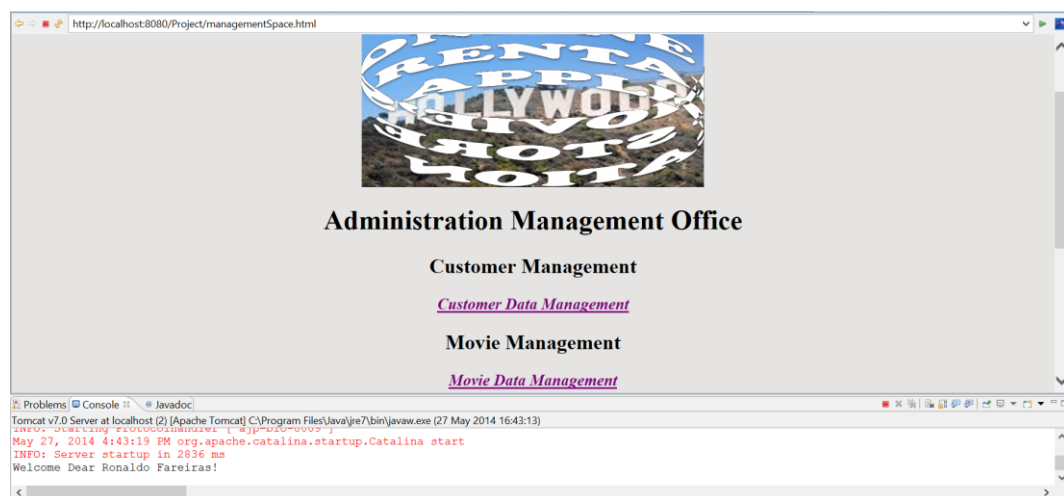


Figure 26. Administrator management page

At this stage, CustomersManagement.jsp and ManagementCustomer.java files are linked and working together. So, the administrator has the customer management interface which is able to modify the customer data related to the content of customer shopping in the store during period of time. The administrator has focused on the data stored and saved on the database on the shopping cart interface to manage the customer data.

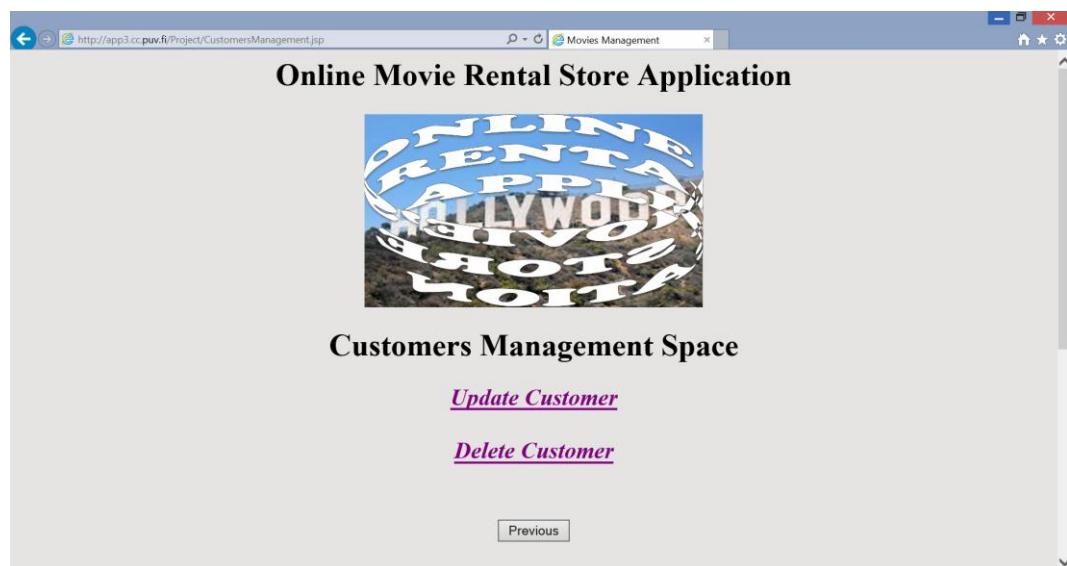


Figure 27. Customer management Interface

The administrator is allowed to update customer data by information obtained from the customer notifications.

Update Customer Information

Firstname	Lastname	Address	Username	Password	City	Zip Code	State	Country	Phone Number	email	
Oluseye	Johnson	olusejo	deborah	Olympiakatu 23 F 45	Vaasa	Ostrobotnia	65100	Finland	0506237800	olusejo@anvia.se	<input type="checkbox"/>
Adeyemi	Adesokan	adeyemzo	yemi1983	Sepankyla 23 T 21	Vaasa	Ostrobotnia	65230	Finland	0509766315	adeyemzo@yahoo.com	<input type="checkbox"/>
Omar	Yehia	omarye	mohammed	Palosaarinkatu 12 D 35	vaasa	Lansisuomi	65200	Finland	0466665432	omarye@puv.fi	<input type="checkbox"/>
Jacob	Moyosade	jack	moyo	Olympiakatu 32 R 21	Vaasa	Ostrobotnia	65100	Finland	0508761234	jacomoyo@gmail.com	<input type="checkbox"/>
Ibrahim	Olanigan	olani	ibra	Loftis 45 G 23	Vaasa	Ostrobotnia	65100	Finland	0448675423	salalite@gmail.com	<input type="checkbox"/>
Jeffrey	Obazee	nosajo	obazee	Loftis 31 K 78	Vaasa	Ostrobotnia	76100	Finland	0507812645	njo_jeff@yahoo.com	<input type="checkbox"/>
Joss	Villa	josvill	norvege	Saarjarventie 14 F 52	Kuopio	Savonia	70460	Finland	0509786543	josvill@savonia.fi	<input type="checkbox"/>
Juha	Kurki	juhku	lejona	Saarjarventie 14 S 32	Kuopio	Savonia	70540	Finland	0507896512	juhku@vr.fi	<input type="checkbox"/>
Claro	U.W	Pi	umwiza	olympiakatu 13A24	Vaasa	Ostrobothnia	65100	Finland	06543978	umwiza26@outlook.com	<input type="checkbox"/>
Marek	Krajewski	marekraj	poland	Keloniemiekatu 28 Z 34	vaasa	Ostrobotnia	65320	Finland	0464356781	marekraj@gmail.com	<input type="checkbox"/>
Alberto	Alvaro	alberto1	barcelona	Hietoniemikatu 22 F 13	Vaasa	Ostrobotnia	65230	Finland	0908763452	alberto1@barcelona.sp	<input checked="" type="checkbox"/>

Update

Previous

Figure 28. Update of customer data window.

The administrator is allowed to delete customer data by information obtained from the customer shopping constant for a period of time. Before any action, the administrator has to send an announcement or notification to the customer to know about his absence during a period of time. The information provided from the database which are stored and saved in the shopping cart data updated.

Delete Customer Information

Firstname	Lastname	Username	Password	Address	City	Zip Code	State	Country	Phone Number	email	
Oluseye	Johnson	olusejo	deborah	Olympiakatu 23 F 45	Vaasa	Ostrobotnia	65100	Finland	0506237800	olusejo@anvia.se	<input type="checkbox"/>
Adeyemi	Adesokan	adeyemzo	yemi1983	Sepankyla 23 T 21	Vaasa	Ostrobotnia	65230	Finland	0509766315	adeyemzo@yahoo.com	<input type="checkbox"/>
Omar	Yehia	omarye	mohammed	Palosaarinkatu 12 D 35	vaasa	Lansisuomi	65200	Finland	0466665432	omarye@puv.fi	<input type="checkbox"/>
Jacob	Moyosade	jack	moyo	Olympiakatu 32 R 21	Vaasa	Ostrobotnia	65100	Finland	0508761234	jacomoyo@gmail.com	<input type="checkbox"/>
Ibrahim	Olanigan	olani	ibra	Loftis 45 G 23	Vaasa	Ostrobotnia	65100	Finland	0448675423	salalite@gmail.com	<input type="checkbox"/>
Jeffrey	Obazee	nosajo	obazee	Loftis 31 K 78	Vaasa	Ostrobotnia	76100	Finland	0507812645	njo_jeff@yahoo.com	<input type="checkbox"/>
Joss	Villa	josvill	norvege	Saarjarventie 14 F 52	Kuopio	Savonia	70460	Finland	0509786543	josvill@savonia.fi	<input type="checkbox"/>
Juha	Kurki	juhku	lejona	Saarjarventie 14 S 32	Kuopio	Savonia	70540	Finland	0507896512	juhku@vr.fi	<input type="checkbox"/>
Claro	U.W	Pi	umwiza	olympiakatu 13A24	Vaasa	Ostrobothnia	65100	Finland	06543978	umwiza26@outlook.com	<input type="checkbox"/>
Marek	Krajewski	marekraj	poland	Keloniemiekatu 28 Z 34	vaasa	Ostrobotnia	65320	Finland	0464356781	marekraj@gmail.com	<input type="checkbox"/>
Alberto	Alvaro	alberto1	barcelona	Hietoniemikatu 22 F 13	Vaasa	Ostrobotnia	65230	Finland	0908763452	alberto1@barcelona.sp	<input type="checkbox"/>

Delete

Figure 29. Deleting customer data.

At this stage, MoviesManagement.jsp and ManagementFilm.java files are linked and working together. The administrator has the movie management interface

which is able to modify the movie data related to the interest of customers via notification or by adding novelty movies.

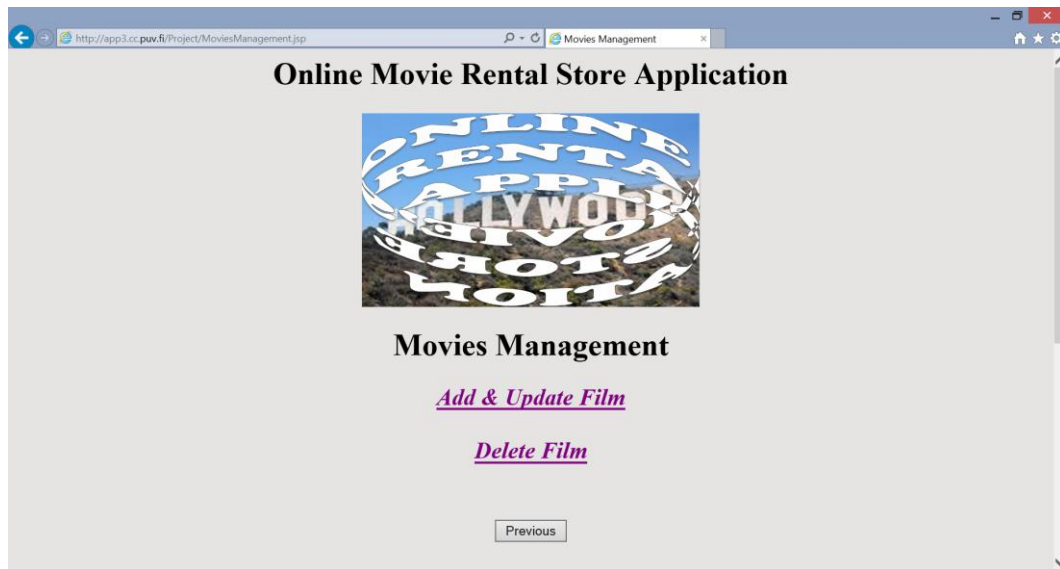


Figure 30. Movie management interface

The administrator is allowed to update the film data and to add new films.




Figure 31. Page to add movies

The administrator is allowed to delete a film by information obtained from the customer shopping interest for a period of time. The information is provided from the database which is stored and saved in the shopping cart data updated.

Administrator Delete Film

Online Movie Rental Store Application



Delete Film From Catalog

Title	Description	Actor name	Length	Release year	Quantity	Rental	Duration	Price
The Hunger Games: Catching Fire	Katniss Everdeen and Peeta Mellark become targets of the Capitol after their victory in the 14th Hunger Games sparks a rebellion in the Districts of Panem	Pearl Bailey, Eleanor Tomlinson, Orlando Bloom, Nancy Wilson, Diane Warren, Dick	02:10:51	1999-01-01	3 days	51	0.14	<input type="checkbox"/>
The Good, the Bad and the Ugly	A bounty hunting scam joins two men in an uneasy alliance against a third in a race to find a fortune in gold buried in a remote cemetery	John Cusack, Steve Cochran, Steve Cochran, Glenn C. Randall Walsh, Cindy Williams	01:54:09	2014-01-01	3 days	40	9.99	<input type="checkbox"/>
12 Years a Slave	In the antebellum United States, Solomon Northup, a free black man from upstate New York, is abducted and sold into slavery	Joanne Whalley-Kilmer, Howard Duff, Patty Duke, Johnny Depp, Jessica Hahn, John Huston	01:20:50	2013-01-01	3 days	50	0.18	<input type="checkbox"/>
One Flew Over the Cuckoo's Nest	Upon admittance to a mental institution, a trouble rebel rallies the patients to take on the oppressive head nurse	Robin Ferguson, Vicente Fernandez, Kay Francis, Don Freedman, Janice Fox, Fred	02:50:40	1993-01-01	3 days	50	0.18	<input type="checkbox"/>
Apocalypse Now	During the US Viet Nam War, Captain Willard is sent on a dangerous mission into Cambodia to assassinate a renegade colonel who has set himself up as a god among a local tribe	Shah Field, Dennis Franz, William Frawley, Virginia Field, Stefan Fetsch, José	01:22:40	1991-01-01	3 days	51	0.65	<input type="checkbox"/>
The Silence of the Lambs	A young FBI cadet must confide in an incarcerated and manipulative killer to receive his help on catching another serial killer who skins his victims	Jimmy Durante, Dennis Dorman, Enid Foy, Dick Foy, Janice Fox, Tom Francis	02:09:10	2018-01-01	3 days	50	9.02	<input type="checkbox"/>
The Conjuring	Paranormal investigation Ed and Lorraine Warren work to help a family terrorized by a dark presence in their farmhouse	Leopold Stokowski, Jane Seymour, Ralph Edwards, Bob Roberts, Erik Estrada, Clint	01:45:30	2008-01-01	3 days	28	0.14	<input type="checkbox"/>
North by Northwest	A hapless New York advertising executive is mistaken for a government agent by a group of foreign spies, and is pursued across the country while he looks for a way to survive	Jack Klugman, Elin Karem, Dennis James, Quincy Jones, Shirley Jones, Sonny James	02:20:10	1999-01-01	3 days	56	4.02	<input type="checkbox"/>
Once Upon a Time in the West	Epic story of a mysterious stranger with a harmonica who joins forces with a notorious desperado to protect a beautiful widow from a ruthless assassin working for the railroad	Chuck Ham, Lloyd Hamilton, Cheryl Hines, Colin Firth, Ledy Frizzell, William	01:54:27	2014-01-01	3 days	15	0.65	<input type="checkbox"/>
A Clockwork Orange	In future Britain, charismatic delinquent Alex DeLarge is jailed and volunteers for an experimental aversion therapy developed by the government in an effort to solve society's crime problem, but not all goes according to plan	Henry King, Jimmy Kimmel, Alan Jackson, Van Johnson, Susan Hayward, Raymond Hat	02:54:00	2007-01-01	3 days	50	4.09	<input type="checkbox"/>
No Country for Old Men	Violence and mayhem ensue after a hunter stumbles upon a drug deal gone wrong and more than two million dollars in cash near the Rio Grande	Jose Inchausti, John Ireland, Hugh Jackman, Rex Ingram, Marg Helgenberger, Van Hef	02:02:45	1994-01-01	3 days	26	0.53	<input type="checkbox"/>
The Treasure of the Sierra Madre	Fred Dobbs and Bob Curtis, two Americans searching for work in Mexico, convince an old prospector to help them mine for gold in the Sierra Madre Mountains	Creighton Hale, Katherine Hepburn, William Haines, Don Haggerty, Hanna-Barbera	02:35:09	2010-01-01	3 days	93	2.07	<input type="checkbox"/>
Short Term 12	A 20-something supervising staff member of a residential treatment facility navigates the troubled waters of that world alongside her co-worker and longtime boyfriend	Arthur Godfrey, Steve Guttenberg, Alec Guinness, Texas Guinan, Matt Groening, Pa	02:54:10	2000-01-01	3 days	51	9.07	<input type="checkbox"/>
Batth Candy and the Sandance Kid	Two Western bank robbers flee to Bolivia when the law gets too close	Edwin F. Goldman, Ann Gabriel, Dave Garrovy, Leto Grubel, Morris Gould, Janet	02:13:00	1993-01-01	3 days	50	9.08	<input type="checkbox"/>
The Return of the King	Gandalf and Aragorn lead the World of Men against Sauron's army to draw his gaze from Frodo and Sam as they approach Mount Doom with the One Ring	Eddie Fisher, Flora Finch, Barry Fitzgerald, George Forman, Simon Fuller, A	02:43:00	2006-01-01	3 days	26	9.07	<input type="checkbox"/>
A Streetcar Named Desire	Disturbed Blanche DuBois moves in with her sister in New Orleans and is tormented by her brutish brother-in-law while her reality crumbles around her	Eddie Foy, Frank Foy, Alice Faye, Charles Farrell, Glenda Farrell, Glenn Ford, W	02:14:20	2005-01-01	3 days	26	9.45	<input type="checkbox"/>
Pulp Fiction	The lives of two mob hit men, a boxer, a gangster wife, and a pair of diner bandits intertwine in four tales of violence and redemption	John Travolta, Uma Thurman, Samuel L. Jackson, Bruce Willis	02:54:00	1994-01-01	3 days	54	9.89	<input type="checkbox"/>
Titanic	A seventeen-year-old aristocrat, expecting to be married to a rich heir by her mother, falls in love with a kind but poor artist aboard the luxurious, ill-fated R.M.S. Titanic	Leonardo DiCaprio, Kate Winslet, Billy Zane, Kathy Bates	03:14:00	1997-01-01	3 days	26	4.70	<input type="checkbox"/>
The Godfather	The aging patriarch of an organized crime dynasty transfers control of his clandestine empire to his reluctant son	Marlon Brando, Al Pacino, James Caan, Diane Keaton	02:55:00	1972-01-01	3 days	25	8.98	<input type="checkbox"/>
Amator	A paraplegic Marine dispatched to the moon Pandora on a unique mission becomes torn between following his orders and protecting the world he finds in his home	Sam Worthington, Zoe Saldana, Sigourney Weaver, Michelle Rodriguez	02:42:00	2009-01-01	3 days	26	8.78	<input type="checkbox"/>
Sherlock Holmes	Detective Sherlock Holmes and his stalwart partner Watson engage in a battle of wits and brains with a genius whose plot is a threat to all of Engla	Robert Downey Jr., Jude Law, Rachel McAdams, Mark Strong	02:08:00	2009-01-01	3 days	25	9.89	<input type="checkbox"/>
Noah	A man is chosen by his world's creator to undertake a momentous mission before an apocalyptic flood cleanses the world	Russell Crowe, Jennifer Connelly, Anthony Hopkins, Doreen Armstrong, Ari Handel	02:18:00	2014-01-01	3 days	51	9.89	<input type="checkbox"/>
Inception	A skilled extractor is offered a chance to regain his old life as payment for a task considered to be impossible	Leonardo DiCaprio, Joseph Gordon-Levitt, Ellen Page, Ken Watanabe	02:28:00	2010-01-01	3 days	20	4.59	<input type="checkbox"/>
Psycho	A Phoenix secretary steals \$40,000 from her employer's client, goes on the run and checks into a remote motel run by a young man under the domination of his mother	Anthony Perkins, Janet Leigh, Vera Miles, John Gavin, Alfred Hitchcock	01:49:00	1960-01-01	3 days	26	0.78	<input type="checkbox"/>
Neighbors	A couple with a newborn baby face unexpected difficulties after they are forced to live next to a fraternity house	Shel Long, Rose Byrne, Zac Efron, Nicholas Stoller	02:03:00	2014-01-01	3 days	25	9.87	<input type="checkbox"/>

Delete

Figure 32. Page to delete movies

5 IMPLEMENTATION

5.1 Description

The web application based on a shopping system should be implemented with the visualization functionalities of both the customer interface and the administrative module; the ordering functionalities of customer interface; the editing functionalities of the administrative module and the functionalities of the MySQL database system. I focused on the Java and JSP files, to precede the description of system implementation and the installation processes.

5.2 Implementation of Function

Generally, the implementation can be divided into Customer Interface implementation and, Administrator Interface implementation. As mentioned above, the Customer Interface was mainly implemented with html Customer Interface based on JSP page, the functions were implemented as shown in class diagrams and sequence diagrams. In the following, the detailed description is showed with the analysis of the code.

5.2.1 Customer Login

In this step, the customer data filled into login customer interface is checked from the database if it really exists to be validated.

```
String n=request.getParameter("username");
String p=request.getParameter("password");

if(Login.validate(n, p) != null){
Customer customer = Login.getinfo(n,p);

HttpSession session = request.getSession();

if(customer != null) {

System.out.println("Customer " + customer.getCustomer_Id() + " -
Welcome Dear " + customer.getFirstname());

        session.setAttribute("Customer", customer);
```

```

        }else
            System.out.println("Customer is not ex-
isted");

        RequestDispatcher
rd=request.getRequestDispatcher("check1");
        rd.include(request,response);

    }

```

Snippet 2. Checking customer data from the database.

After the checking is done, if the customer data really exists, the customer has access to the films catalog page to start the purchase operation.

Otherwise, the customer receives message ("Username or password has error, try to login again please!")

5.2.2 Show Available Movies

Products.java and FilmCatalog.jsp files are responsible for collecting from the database and display all films in order the customer to have access to available films in the film catalog.

```

ArrayList<Film> productList = new ArrayList<Film>();
    getConnection();
    stmt = conn.prepareStatement("SELECT title, description, ac-
tor_name, length, release_year, rentalDuration, quantity, price
FROM film");
    rs = stmt.executeQuery();

    while(rs.next())
    {
        Film movie = new Film();
        movie.setTitle(rs.getString(1));
        movie.setDescription(rs.getString(2));
        movie.setActor_name(rs.getString(3));
        movie.setLength(rs.getString(4));
        movie.setRelease_year(rs.getString(5));
        movie.setRentalDuration(rs.getString(6));
        movie.setQuantity(rs.getInt(7));
        movie.setPrice(rs.getDouble(8));
        productList.add(movie);
    }

```

Snippet 3. Collecting products from the database.

After the customer has access to the film catalog, he or she cannot purchase the same movie twice.

```
<%
    while (prodListIterator.hasNext())
    {
        Film movie = (Film)prodListIterator.next();
        int OrderQuantity = 1;
%>
```

In the customer film selection, can the customer can add several films.

```
for(int i=0; i<items.size(); i++)
{
    Film film = items.elementAt(i);

    if(film.getTitle().equals(newItem.getTitle()))
    {

        film.setOrderQuantity(film.getOrderQuantity()+newItem.getOrd
erQuantity());
        items.setElementAt(film,i);
        flag = true;
        break;
    }

    if(newItem.getOrderQuantity()>0&&(flag==false))
    {
        items.addElement(newItem);
        incrementOrderQuantity();
    }
}
```

Snippet 4. Adding products to the shopping cart

The customer can also delete a film from the basket.

```
items.removeElementAt(itemIndex);
decrementOrderQuantity();
```

The total number of films and total price are calculated according to the customer basket made during the shopping time.

```
String itemOrderQuantity = "" + item.getOrderQuantity();
total-
Price=totalPrice+item.getPrice()*Integer.parseInt(itemOrderQuantit
y);
```

5.2.3 Customer Account

The customer data stored and saved on the database are received by function

```
Customer getinfo (String username, String password){
temp.setCustomer_Id(rs.getString("customer_id"));
temp.setFirstname(rs.getString("firstname"));
temp.setLastname(rs.getString("lastname"));
temp.setAddress( rs.getString("address"));
temp.setCity(rs.getString("city"));
temp.setZipcode(rs.getString("zipcode"));
temp.setState(rs.getString("state"));
temp.setCountry( rs.getString("country"));
}
```

Snippet 5. Receiving customer data from the database.

The shipment and bill customer information is stored and saved on the database by these connection statements

```
stmt.executeUpdate("insert into shipping(customer_id, firstname,
lastname, address, city, state, zipcode, country, movieReturnDate,
shipmentType, postalFees)values('" + shipping.getCustomer_Id() +
"', '" + shipping.getFirstname() + "', '" + shipping.getLastname() +
"', '" + shipping.getAddress() + "', '" + shipping.getCity() + "', '"
+ shipping.getState() + "', '" + shipping.getZipcode() + "', '" +
shipping.getCountry() + "', '" + shipping.getMovieReturnDate() +
"', '" + shipping.getShipmentType() + "', '" + ship-
ping.getPostalFees() + "')");
```

```
stmt.executeUpdate("insert into billing(customer_id, nameOnCard,
creditCardType, creditCardNumber, creditCardExpiration) values('"
+ billing.getCustomer_Id() + "', '" + billing.getNameOnCard() +
"', '" + billing.getCreditCardType() + "', '" + bill-
ing.getCreditCardNumber() + "', '" + bill-
ing.getCreditCardExpiration() + "')");
```

```
stmt.executeUpdate("insert into shoppingCart(customer_id,
firstname, lastname, title, orderquantity) values('" + ship-
ping.getCustomer_Id() + "', '" + shipping.getFirstname() + "', '" +
shipping.getLastname() + "', '" + title + "', '" +
cart.getOrderQuantity() + "')");
```

Snippet 6. Sending customer shopping cart to the database.

5.2.4 Administrator Login

In this step, the administrator data filled into the login administrator interface is checked from the database if it really exists to be validated.

```
String n=request.getParameter("username");
String p=request.getParameter("password");

if(LoginAdmin.validate(n, p)){
RequestDispatcher rd=request.getRequestDispatcher("/check3");
rd.include(request, response);
}
```

Snippet 7. Checking administrator data from the database.

After the checking is done, if the administrator data really exist, the administrator has access to the Administrator Management Interface to start the management operation. Otherwise, the administrator receives message ("Username and Password can't be empty!")

```
else{
RequestDispatcher rd = re-
quest.getRequestDispatcher("erroradmin.html");
rd.include(request, response);
}
```

5.2.5 Updating Customer

The administrator selects customer data from the database and updates it by pressing button 'Update from Management update customer interface'.

```
<%
List<String> list = Store.ManagementCustomer.GetCustomers();

int customer_id = 0;
String box = null;

Iterator<String> it = list.iterator();

while (it.hasNext()) {
customer_id = Integer.parseInt(it.next());
out.print("<tr>");
for (int i = 0; i < 11; i++) {
out.print("<td>");
out.print(it.next());
out.print("</td>");
```

```

    }
    out.print("<td>");
    box = "<input name=r" + customer_id + " type='checkbox'>";
    out.print(box);
    out.print("</td>");
    out.print("</tr>");
}
%>

```

Snippet 8. Updating customer data from the database.

ManagementCustomer.java and ManagementUpdateCustomer.jsp files are linked together and act in a way that updating customer data is done by selecting customer id from the customer data. The administrator acts upon the notification mentioned from the customer, in case the customer has a new phone number or new address.

```

String update = "UPDATE FROM customer WHERE customer_id =?";
ps = conn.prepareStatement(update);
ps.setString(1, customer_id);
ps.executeUpdate();
System.out.println("Customer Successful updated");
conn.close();

```

5.2.5 Deleting Customer

In this stage, the administrator selects customer data from the database and updates it by pressing button 'Delete from Management delete customer interface'.

```

<%
    List<String> list = Store.ManagementFilm.GetFilms();
    int film_id = 0;
    String box = null;

    Iterator<String> it = list.iterator();

    while (it.hasNext()) {
        film_id = Integer.parseInt(it.next());
        out.print("<tr>");
        for (int i = 0; i < 8; i++) {
            out.print("<td>");
            out.print(it.next());
            out.print("</td>");
        }
        out.print("<td>");
        box = "<input name=r" + film_id + " type='checkbox'>";
        out.print(box);
        out.print("</td>");
        out.print("</tr>");

```



```
}  
%>
```

ManagementCustomer.java and ManagementDeleteCustomer.jsp files are linked together and act in a way that deleting customer data is done by selecting the customer id from the customer data stored and saved on the database.

```
String delete = "DELETE FROM customer WHERE customer_id =?";  
ps = conn.prepareStatement(delete);  
ps.setString(1, customer_id);  
ps.executeUpdate();  
System.out.println("Customer Successful Deleted");
```

Snippet 9. Deleting customer data from the database.

6 TESTING

In order to guarantee the quality of the application, a system test of the Online Movie Rental Store was implemented. Two types of tests were made: a component system test and an Integration system test.

Since the inception of the system development, a test was run on the MySQL database server after its installation to prove its reliability. Some graphics of the visualization of the web application based on a shopping system were presented in Chapter 5 by using Internet Explorer. In this chapter, attention is paid mainly to testing the project, by using customer shopping applications and administrative module applications.

6.1 Component System Test

The component test mainly aims to test every JSP file in the project. In this sense, the visual web pages of the Online Movie Rental Store Application is divided into the customer interface and the administrative module. The customer interface includes the shopping homepage and customer order page, while the administrative module comprises homepage management (customer and movie) and the log in-pages (customer and administrator).

6.1.1 Customer Interface Testing

AddItem.java, is a Servlet which is responsible for adding film items to the shopping cart. It gets all parameter data for a new film item from the database, instantiates a film instance and calls the addItem method of ShoppingCart to add a new film item to the shopping cart. It then transfers control to *DisplayItem.jsp* which will be in charge of rendering the catalog and the updated shopping cart. This conforms to a typical pattern of an MVC controller.

When a customer orders movies from the store, the JSP files (DisplayItem, Checkout, CheckoutBilling and ConfirmationOrder) are responsible for the customer's ordering functionalities.

The customer interface proved to be reliable and efficient after running the system test. One could, thus, prove a synchronizing ability comparable to other systems.

6.1.2 Customer Login Testing

The objective of this experiment was to observe how the server reacts during the different stages of login process by clicking the login button and add the attributes for the 'customer login interface'.

- **Test Login**

The input username does not exist.

The test result:

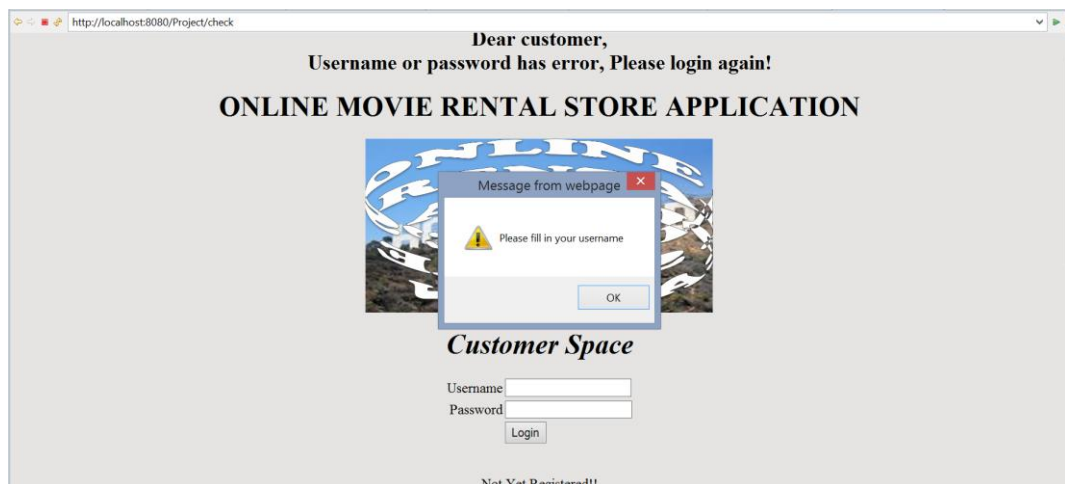


Figure 33. Test customer login result 1

The input password does not exist.

The test result:

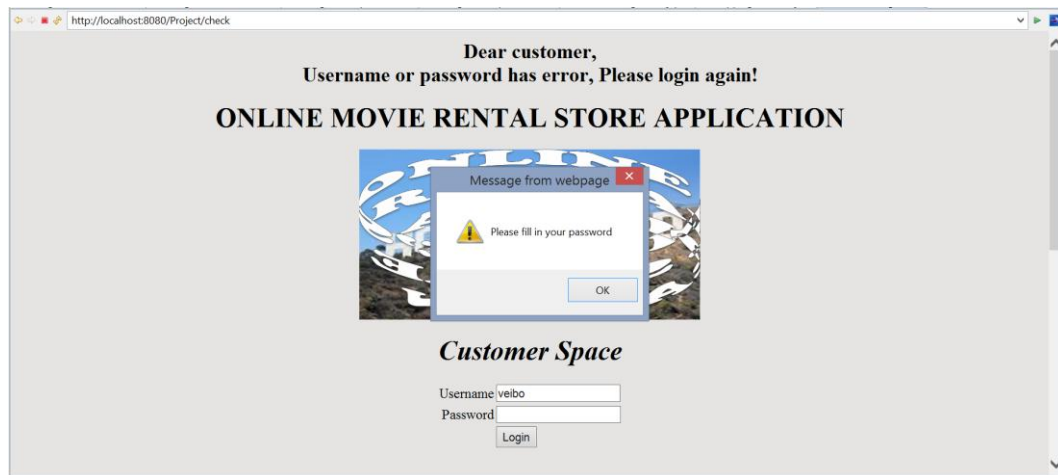


Figure 34. Test customer login result 2

6.1.3 Administrative Login Testing

As mentioned earlier for ‘customer login interface’, the login procedure was also the same for this stage.

- **Test Login**

The input username does not exist.

The test result:

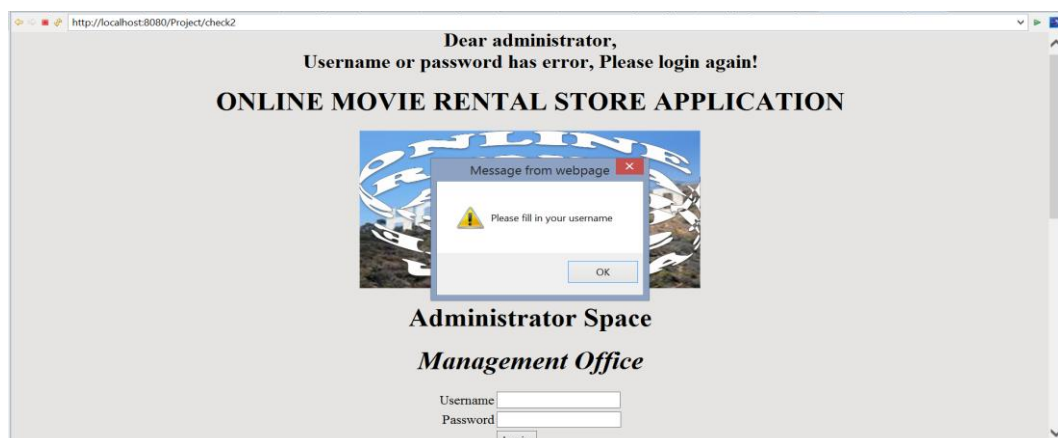


Figure 35. Test administrator login result 1

The input password does not exist.

The test result:

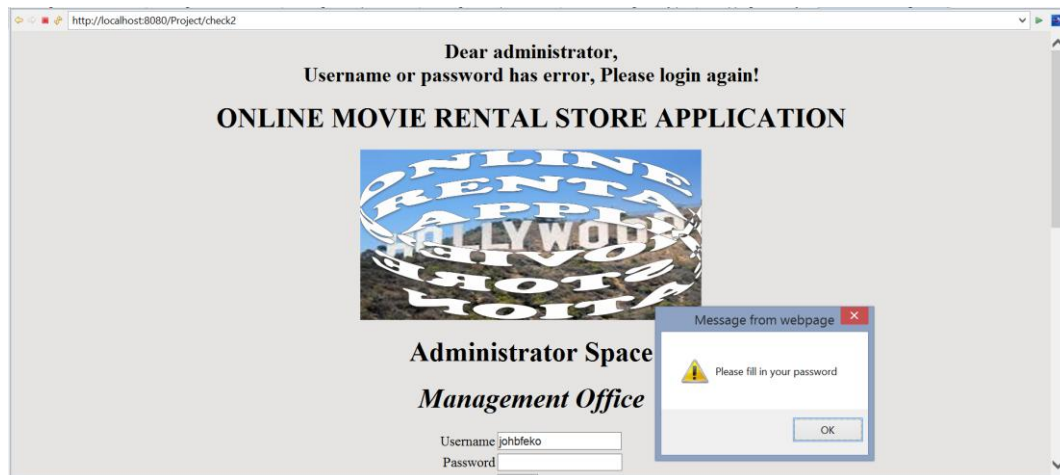


Figure 36. Test administrator login result 2

6.2 System Test of Ordering Functionalities and Data Saved in Database

6.2.1 Administrator Registration Testing

- Test Login

Input administrator registration

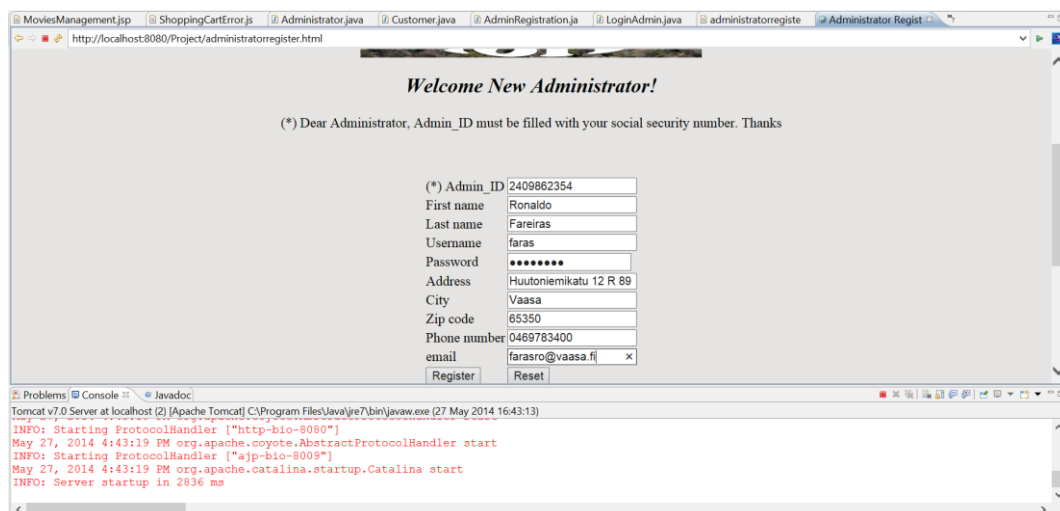


Figure 37. Test administrator register result 1

The test result:

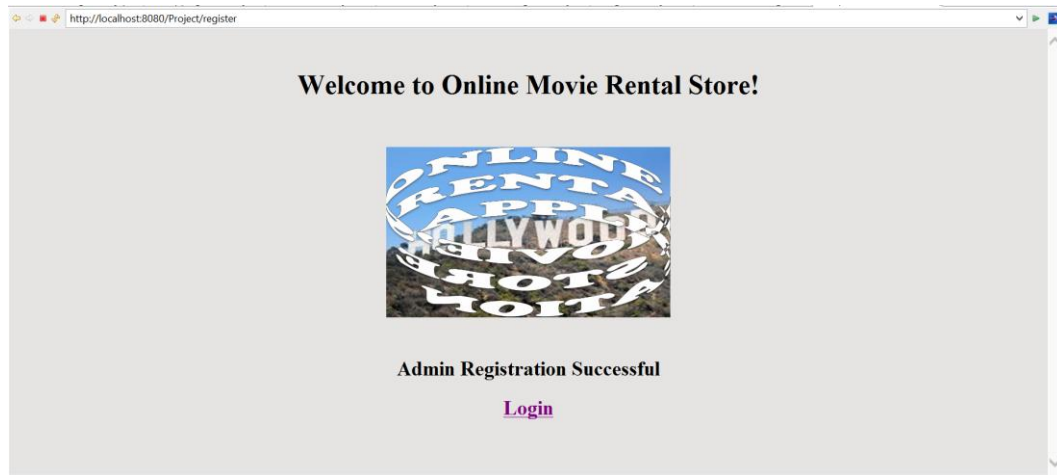


Figure 38. Test administrator register result 2

6.2.2 Administrator Adding Film from Database Testing

- **Test: Add Film**

Input add film

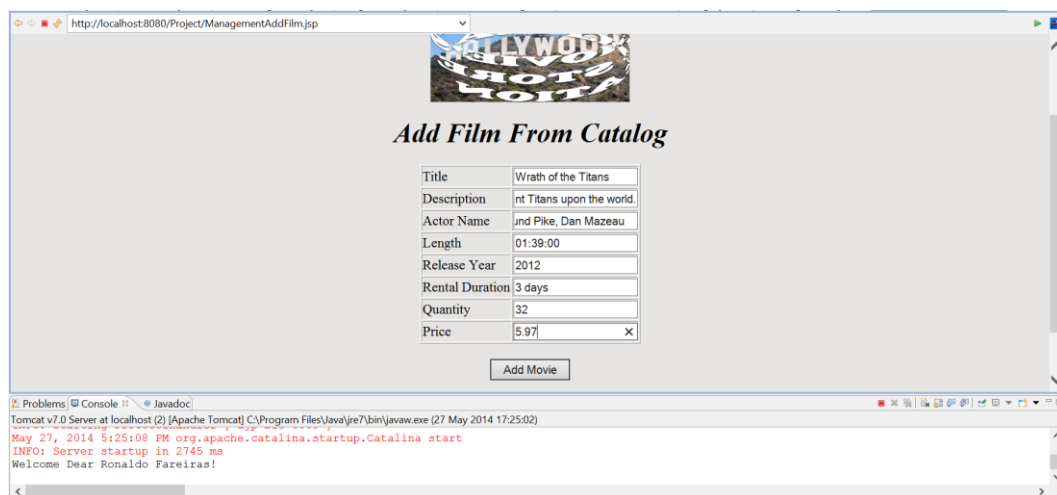


Figure 39. Test result add film 1

The test result:

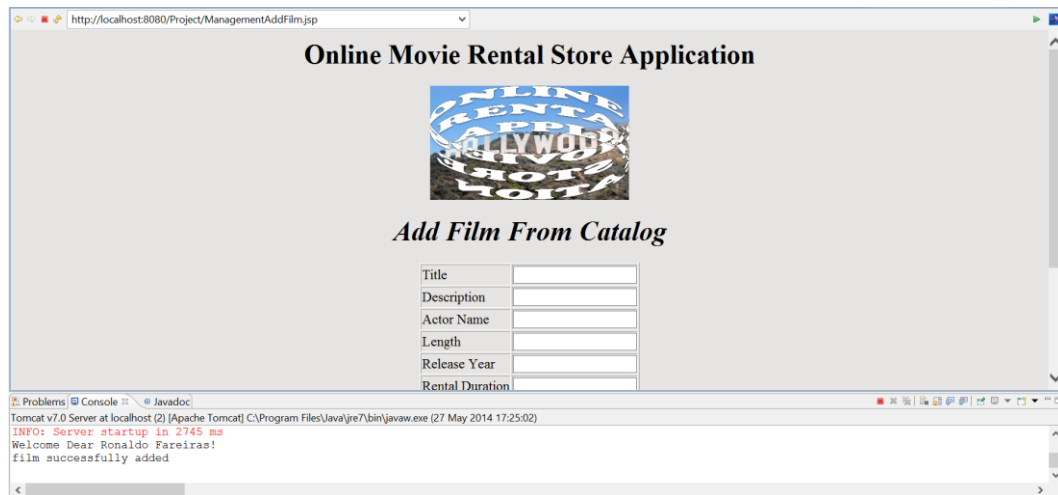


Figure 40. Test result add film 2

6.2.3 Administrator Deleted Film from Database Testing

- **Test: Add Film**

Input delete film

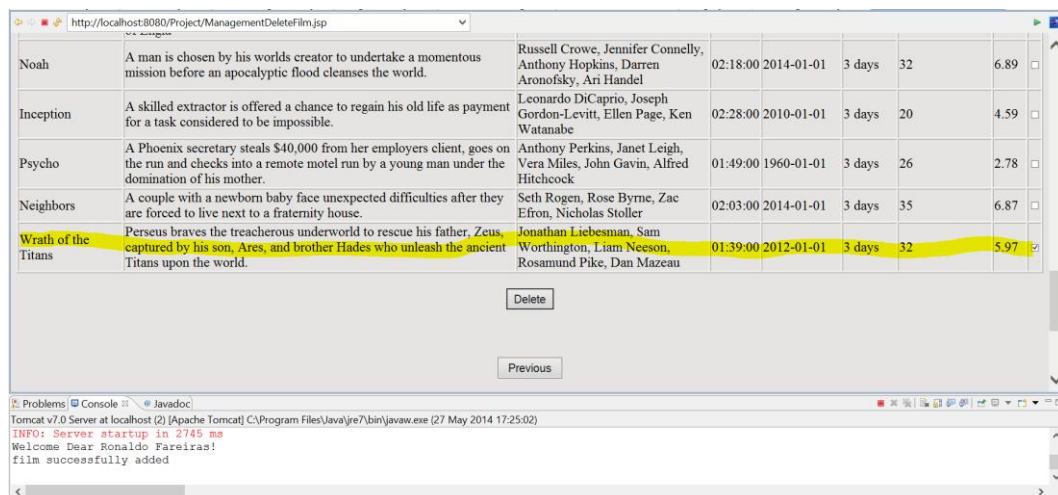


Figure 41. Test result delete film 1

The test result:

Movie Title	Description	Cast	Release Date	Duration	Days	Rating	Price
The Godfather	The aging patriarch of an organized crime dynasty transfers control of his clandestine empire to his reluctant son.	Marlon Brando, Al Pacino, James Caan, Diane Keaton	02:35:00 1972-01-01	3 days	23	1.98	
Avatar	A paraplegic Marine dispatched to the moon Pandora on a unique mission becomes torn between following his orders and protecting the world he feels is his home.	Sam Worthington, Zoe Saldana, Sigourney Weaver, Michelle Rodriguez	02:42:00 2009-01-01	3 days	26	6.78	
Sherlock Holmes	Detective Sherlock Holmes and his stalwart partner Watson engage in a battle of wits and brawn with a nemesis whose plot is a threat to all of Engla	Robert Downey Jr., Jude Law, Rachel McAdams, Mark Strong	02:08:00 2009-01-01	3 days	23	5.89	
Noah	A man is chosen by his worlds creator to undertake a momentous mission before an apocalyptic flood cleanses the world.	Russell Crowe, Jennifer Connelly, Anthony Hopkins, Darren Aronofsky, Ari Handel	02:18:00 2014-01-01	3 days	32	6.89	
Inception	A skilled extractor is offered a chance to regain his old life as payment for a task considered to be impossible.	Leonardo DiCaprio, Joseph Gordon-Levitt, Ellen Page, Ken Watanabe	02:28:00 2010-01-01	3 days	20	4.59	
Psycho	A Phoenix secretary steals \$40,000 from her employers client, goes on the run and checks into a remote motel run by a young man under the domination of his mother.	Anthony Perkins, Janet Leigh, Vera Miles, John Gavin, Alfred Hitchcock	01:49:00 1960-01-01	3 days	26	2.78	
Neighbors	A couple with a newborn baby face unexpected difficulties after they are forced to live next to a fraternity house.	Seth Rogen, Rose Byrne, Zac Efron, Nicholas Stoller	02:03:00 2014-01-01	3 days	35	6.87	

Console Output:

```

Welcome Dear Ronaldo Fareiras!
film successfully added
film successfully deleted

```

Figure 42. Test result delete film 2

6.2.4 Administrator Deleted Customer from Database Testing

- Test: Delete Customer

Input delete customer

Firstname	Lastname	Username	Password	Address	City	Zip Code	State	Country	Phone Number	email
Oluseye	Johnson	olusejo	deborah	Olympiakatu 23 F 45	Vaasa	65100	Ostrobothnia	Finland	0506237800	olusejo@anvia.se
Adeyemi	Adesokan	adeyemzo	yemi1983	Sepankyla 23 T 21	Vaasa	65230	Ostrobothnia	Finland	0509766315	adeyemzo@yahoo.com
Omar	Yehia	omarye	mohammed	Palosaarikatu 12 D 35	Vaasa	65200	Lansisuomi	Finland	0466665432	omarye@puv.fi
Jacob	Moyosade	jack	moyo	Olympiakatu 32 R 21	Vaasa	65100	Ostrobothnia	Finland	0508761234	jacomoyo@gmail.com
Ibrahim	Olanigan	olani	ibra	Lofis 45 G 23	Vaasa	65100	Ostrobothnia	Finland	0448675423	salalite@gmail.com
Jeffrey	Obazee	nosajo	obazee	Lofis 31 K 78	Vaasa	76100	Ostrobothnia	Finland	0507812645	njo_jeff@yahoo.com
Joss	Villa	josvill	norvege	Saarjarventie 14 F 52	Kuopio	70460	Savonia	Finland	0509786543	josvill@savonia.fi
Juha	Kurki	juhku	lejona	Saarjarventie 14 S 32	Kuopio	70540	Savonia	Finland	0507896512	juhku@vr.fi
Claro	U.W	Pi	umwiza	olympiakatu 13A24	Vaasa	65100	Ostrobothnia	Finland	06543978	umwiza26@outlook.com
Marek	Krajewski	marekraj	poland	Keloniemikatu 28 Z 34	Vaasa	65320	Ostrobothnia	Finland	0464356781	marekraj@gmail.com
Alberto	Alvaro	alberto1	barcelona	Hietoniemikatu 22 F 13	Vaasa	65230	Ostrobothnia	Finland	0908763452	alberto1@barcelona.sp

Console Output:

```

Welcome Dear Ronaldo Fareiras!
INFO: Server startup in 3673 ms
Welcome Dear Ronaldo Fareiras!

```

Figure 43. Test result delete customer 1

The test result:

Delete Customer Information

Firstname	Lastname	Username	Password	Address	City	Zip Code	State	Country	Phone Number	email
Oluseye	Johnson	olusejo	deborah	Olympiakatu 23 F 45	Vaasa	65100	Ostrobothnia	Finland	0506237800	olusejo@anvia.se
Adeyemi	Adesokan	adeyemzo	yemi1983	Sepankyla 23 T 21	Vaasa	65230	Ostrobothnia	Finland	0509766315	adeyemzo@yahoo.com
Omar	Yehia	omarye	mohammed	Palosaarinkatu 12 D 35	vaasa	65200	Lansisuomi	Finland	0466665432	omarye@puv.fi
Jacob	Moyosade	jack	moyo	Olympiakatu 32 R 21	Vaasa	65100	Ostrobothnia	Finland	0508761234	jacomoyo@gmail.com
Ibrahim	Olanigan	olani	ibra	Loftis 45 G 23	Vaasa	65100	Ostrobothnia	Finland	0448675423	salalite@gmail.com
Jeffrey	Obazee	nosajo	obazee	Loftis 31 K 78	Vaasa	76100	Ostrobothnia	Finland	0507812645	njo_jeff@yahoo.com
Joss	Villa	josvill	norvege	Saarjarventie 14 F 52	Kuopio	70460	Savonia	Finland	0509786543	josvill@savonia.fi
Juha	Kurki	juhku	lejona	Saarjarventie 14 S 32	Kuopio	70540	Savonia	Finland	0507896512	juhku@vr.fi
Claro	U.W	Pi	umwiza	olympiakatu 13A24	Vaasa	65100	Ostrobothnia	Finland	06543978	umwiza26@outlook.com
Marek	Krajewski	marekraj	poland	Keloniemiekatu 28 Z 34	vaasa	65320	Ostrobothnia	Finland	0464356781	marekraj@gmail.com

Problems Console Javadoc
 Tomcat v7.0 Server at localhost (2) [Apache Tomcat] C:\Program Files\Java\jre7\bin\javaw.exe (29 May 2014 10:35:37)
 Welcome Dear Ronaldo Fareiras!
 Customer Successfully Deleted

Figure 44. Test result delete customer 2

6.3 Possible Improvements

After the testing, the application was firstly built on the shared preferences method where the application was only available from my personal device, but the method was later changed to link to the application from the web server where we can browse and get access on it. This process makes the application accessible anytime and anywhere, even with a different device.

7 CONCLUSION

The Internet has become a major resource in modern business, and electronic shopping has, thus, gained prominence, not only from the entrepreneur's but also from the customer's point of view. For economics actors, electronic shopping generates new market opportunities and for the customer, it makes comparative shopping possible. According to a survey, most consumers of online stores are impulsive and usually make a decision to stay on a site within the first few seconds. "A Web application is like a shop interior. If the shop looks poor or like hundreds of other shops the customer is most likely to skip to the other site".^{8/} Hence we have designed the project to provide the user with easy navigation, retrieval of data and necessary feedback as much as possible.

In this project, the user is provided with an e-commerce web site that can be used to buy or rent movies online. It was developed using the Java language, JSP (Java Server Pages) and MySQL. A welcome page appears and then a login page. One can then sign up with the username and password which will be saved into the database created. The customer can then have access to the function in the menu on the application. Every activity on the application is saved on the remote server. The server administrator has the authority to access all the information on the database and monitor traffic on the application for security reasons. The application met all the required details and specifications. The application works perfectly well and is accessible to anyone.

6.4 Future Work

As mentioned in the test, this project also provides a vision of better implementation of future enhancement in movie shopping. On the other hand, using social network such as Facebook and others will encourage the simplification of the user registration and provide an adequate means for access to the application.

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