

E-Commerce Application with Payment Gateway

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Abstract: The term electronic commerce or e-commerce, describes a range of online business activities that are centred around the exchange of goods and services over the internet. So here secure “E - Commerce application with payment gateway” is proposed. For this application dynamic web pages have been created using both client-side and server-side scripts. A dynamic webpage uses a server script to generate a web page. For the testing purpose; website was hosted on a local hosts i.e. personal computers later it was hosted on hosting sites to use it professionally. An HTTP (Hypertext Transfer Protocol) request is made by the browsers like Google Chrome, Mozilla Firefox or Safari to the web server for a particular dynamic web page. The web server then searches the extension of the requested file to determine which application server should handle the request.

A Model-View-Controller format is the standard approach used to design this application. This application consists separate files containing several functions to implement the proposed functionalities. User-friendly and responsive web application which will load quickly and can have easy check-outs with maximum security has been developed.

Keywords: E-commerce, web page, web server, java.

I. Introduction:

Electronic commerce is growing day-by-day. It is an emerging model of new selling and buying goods and services in which buyers are able to participate in all phases of a purchase decision and transmitting of funds or data, over an electronic network, primarily internet. For customers e-commerce make their shopping experience quicker and easier as well as improved customer service. Vendors like Amazon choose to do business online. It gives them some unique advantages over the store-bound competitors. The biggest advantages are the low costs, the flexibility and speed, and the high levels of data.

• Types of e-commerce

1. Business to Business (B2B) - B2B is a type of transaction that occurs between two companies. In this process, one company purchases raw materials from the other.
eg. Ali baba, Ali Express, Shopify.

2. Business to Consumer (B2C) - B2C is a type of business-to-consumer transaction that occurs without a middle person.
eg. Amazon, Walmart.

3. Consumer-to-Consumer (C2C) - C2C e-commerce refers to trading relationships in which both suppliers and purchasers are consumers rather than businesses. It requires interaction between parties via a third party, typically an online auction or trading website. Selling and purchasing on the Internet has never been easier because of this phenomena.
eg. eBay

II. Requirement Specification:

Languages used for the Application:

Front-End: HTML, CSS, JavaScript, Bootstrap.

Back-End: Java, MySQL Database, Spring framework, Hibernate.

Tools used for the Application: Eclipse / IntelliJ IDEA, VS Code, MySQL Workbench / SQL yog Web, Server-Apache Tomcat, Build Management- Maven

III. Literature Survey:

The existing model of e-commerce application is effective but somewhere it lacks in its features, responsiveness, etc. The challenge of building an application with spring boot is crucial. We have briefly discussed some of the existing research articles that are connected to our work in this part. For details on related research publications, see table 1.

TABLE 1: Literature Survey

S r . N o .	Title	Author	Journal	Remark
1	Seasonal Relevance in E-Commerce Search ^[1]	Haode Yang, Parth Gupta, Dan Bu, Dongmei Jia	Conference CIKM 2021 www.cikmconference.org	In this paper, they formally introduce the concept of seasonal relevance. Also they have proposed LogSr and VelSr features i.e based on self-attention using state-of-art neural product seasonality is captured.
2	Understanding e-commerce: a study with reference to competitive economy ^[2]	Neha Wadhawan, R K Arya.	Journal of Critical Reviews ISSN-2394-5125 Vol 7, Issue 8, 2020	A detailed literature survey of factors driving e-commerce growth in India has been mentioned also research methodology and analysis with bar graph has shown.
3	The Role of Internet Marketing on E-Commerce ^[3]	Hossein Niavand, Farzaneh Haghighat Nia, Dr. R. Mahesh	Business and Management Horizons ISSN 2326-0297 2018, Vol. 6, No. 1	Indian Marketing plays an important role in e-commerce by linking the business directly with the consumers. The consumers through the Internet Marketing can discover inaccessible products and purchase it through safe and secure gateway. Development in the field of Internet Marketing has contemplated people to purchase through E-commerce websites. The web enables displaying of variety of items over a mass area in quicker time and comprehend the data received for further changes.
	Developing an E-Commerce Website ^[4]	Syed Emdad Ullah, Tania Alauddin and Hasan U. Zaman.	2016 International Conference on Front-end Technologies	They presented a framework of E-commerce application in which they have used 'Codeigniter' which is an open source web development framework that provided with the support to build application using PHP following MVC pattern. For Front-end they have used HTML, CSS, Javascript languages where as back-end interface they have chosen the MySQL DBMS to hold the database.

			M i c r o e l e c t r o n i c s, C o m p u t i n g a n d C o m m u n i c a t i o n s (M i c r o C o m)	
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5	E-Payment System on E-Commerce in India ^[5]	Karamjeet Kaur , Dr. Ashutosh Pathak	Karamjeet Kaur Int. Journal of Engineering Research and Applications ISSN : 2248-9622, Vol. 5, Issue 2, (Part -1) February 2015, pp.79-87	A detailed literature survey of payment procedure and its types has been mentioned in this paper. Also limitations of traditional payment comparison with digital payment has shown in proper tabular form.
6	Research on E-commerce Business Model based on Intelligent Terminals Mobile ^[6]	Hongyan Xin	2015 7th International Conference on Information Technology in Medicine and Education (ITME)	He has mentioned deep research on e-commerce business model based on Intelligent terminals mobile .He proposed mobile payment strategy and policy recommendations for mobile e-commerce security issues.
7	E-commerce Smart Phone Application [7]	Abdullah Saleh Alqahtani, Robert Godwin	(IJACSA) International Journal of Advanced Computer Science and Applications, Vol.3, No.8, 2012	Paper mainly focuses responsive applications on mobile phones. Also investigate the requirements of e-commerce applications and why normal websites are not suitable for mobile devices. They have tested their application on different smartphones like Iphone ,Ipad ,android simulators.

8	The Compara tive Study of Different E- Commer ce Payment Gateway s ^[8]	Kavita, Dr.U.S. Pandey	International journal of computer science and technology ,IJCST Vol. 2,Issue 4,Oct- Dec.2011.	A detailed Comparison of Different Payment Gateways has been done so that people can choose which payment gateway is secure and suitable for them
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Summary of Literature Survey:

- E-commerce has now become a key component of many organisations in the daily running of their business.
- Making our website responsive and user- friendly is one of the main purpose of the application.
- Secure payments should be top most priority.

IV. Methodology:

The entire application has been subdivided into two parts: Front-end development and the Back-end development. Front-end usually refers to the user interface while back-end focuses on server side of a website users can't see. IDE used for the application is IntelliJ , for database management MySQL workbench and this application is web based application running on Tomcat Server (9.0.57). For testing perspective SwaggerUI is used.

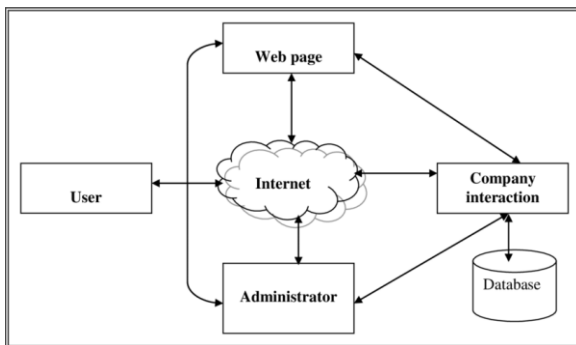


Fig 1. Block Diagram

A) Front-end development:

Initially on front-end side, raw coded sections are made using HTML (Hypertext Markup Language) and JavaScript which is a client side scripting language , and with the help of thymeleaf , templates are created. Thymeleaf is a server side java template used for both web and standalone environments and it is capable of processing HTML, XML, JavaScript, CSS and even a plain text. For visual elements of an application Cascading Style Sheets and Bootstrap has been used. Bootstrap is used to make are application responsive and it contains HTML, CSS, Javascript predefined templates.

B) Back-end development:

For development side Java, Spring boot, Spring JDBC template has been used. Relational Mapping is done with the help of Hibernate. Security is managed with spring security.

a) Working flow:

1. In the very first step, the company must build its own website that presents product information. This is the equivalent of opening a new branch and displaying products in its window in the old-fashioned approaches of business marketing.
2. A secure connection - using spring security - is established between an e-commerce customer and the company's website when they want to buy some things. The client browser must

first authenticate with the server.

3. All data between them is encrypted after the connection is established, and other computers in the nodes along the line will not be able to understand it. 4. When a customer buys something, the computer transmits data to the server informing it of the purchase. The server now checks its storage to verify if they're really available, adds them to the consumer's shopping cart, and sends the results to the customer.

5. If the customer decides to purchase such items, the bill is confirmed by the customer giving the necessary information to the server.

6. The server then loses his role for a short time and is detached from the consumer. Meanwhile, an electronic commerce payment gateway that is trusted on both sides of the transaction steps in ,first by verifying the e-commerce shop's identification in the Commerce Server Database. The customer will be notified by the e-commerce payment gateway, and in exchange, the consumer will submit the e-commerce payment gateway his digital money (credit card, or bank account information and PIN) parameters. As a result, these details will be provided to a financial institution (such as the consumer's bank) in order to monitor the status of the customer's account. If the customer's account has not been overdrawn, the bank network will automatically complete the transaction by withdrawing funds from the customer's account and depositing them in the company's account, which may or may not be in the same financial institution.

b) Modules:

This application has two modules:

1. CustomerModule.
2. Admin Module.

Any member can register and view available products. Registered member and guest can purchase multiple products regardless of quantity. Contact Us page is available to contact Admin for queries. There are three roles available: Visitor, User and Admin. Visitor can view available products. User can view and purchase products.

An Admin has some extra privilege including all privilege of visitor and user.

- Admin can add products, edit product information and add/remove product.
- Admin can add user, edit user information and can remove user.
- Admin can ship order to user based on order placed by sending confirmation mail.

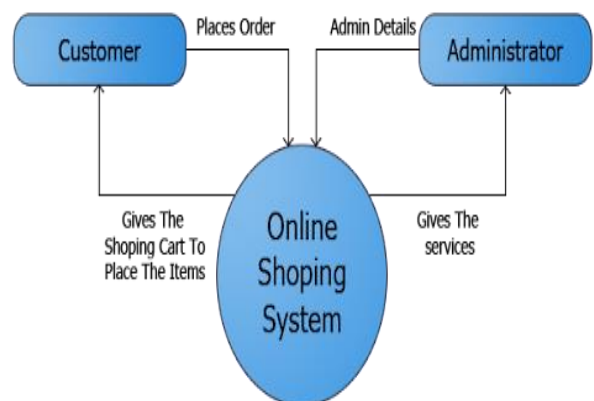


Fig. 2: Application Module

c) Architectural Pattern:

Application has been developed using the standard “Model-View-Controller” pattern. MVC pattern is an architecture design used to implement user interfaces. It divides the programme into three interconnected parts in process of separating internal representations of information from how information is presented to the user for acceptance.

As a result, view serves as the user interface. Controller includes the necessary class files for manipulating data stored on the back end, i.e. the database. It actually serves as a link between the model and the view. It does not have direct access to the database. It can only convey information from the view and information that has been updated to the view.

Finally, the model is the only one who has access to our database; it changes any information entered by the administrator or end-user, such as login and registration pages, as well as prices and goods.

C) Payment Gateway:

The e-commerce payment gateway provides access to the online banking network. To be processed, all online transactions must go through a payment gateway. Payment gateways serve as a link between the user's website and the financial institutions that handle the transaction. Gateways handle the many transactions that occur between the user and the web browser. A payment gateway is a service that authenticates and routes payments. An Internet e-commerce payment gateway is a vital infrastructure component that ensures such transactions go place smoothly and securely via electronic networks. In this application Instamojo is used. With Instamojo one can have access to all payment modes, including credit and debit cards, UPI, and popular mobile wallets.

D. Security

-The Internet is an open network in its nature and in e-commerce we are likely to deal with money which itself requires security. Therefore the security of transactions should be considered seriously. Although there are different methods and standards available today, there are all common in these following requirements:

-Both sides of the transaction (Customer and financial institute) should authenticate each other.

-Because of the Internet's structure as a distribution channel, data travels through numerous nodes from its source to its destination. As a result, data must be unable to be accessed by any third party.

-Protocols such as HTTP-S, HBCI (Home-Banlung Communication Interface), SET (Secure Electronic Transaction), and SSL (Secure Socket Layer), which are the most often used protocols for e-commerce today, have been offered to meet the previously specified standards.

As there are two modules :Admin module and Customer module, so they have been secured. Thus they have been separated as follows: Admin can only access (‘/admin/**’) URL’s and

customer can only access (‘/user/**’) URL’s.

Roles like ROLE_ADMIN is set for Admin and for Customer it is ROLE_USER. When they are authenticated and authorise than they can access to the URL’s which they are privileged to.

1. Authentication: The identity of users are checked for providing the access to the system. User is verified. Validating that users whom they claim to be.

2. Authorization: Giving the user permission to access a specific resource or function.

3. Filter: a filter is an object that is invoked at the pre- processing and post-processing of a request.

Several methods that we can use to configure the behaviour of the form login.

1. loginPage(): the custom login page

2. loginProcessingUrl(): the url to submit the username and password to

3. defaultSuccessUrl(): the landing page after a successful loginForm

Based Authentication:

-Username & Password.

-Standard in mostly websites.

-Forms(Full Control).

-Can logout.

-HTTPS recommended.

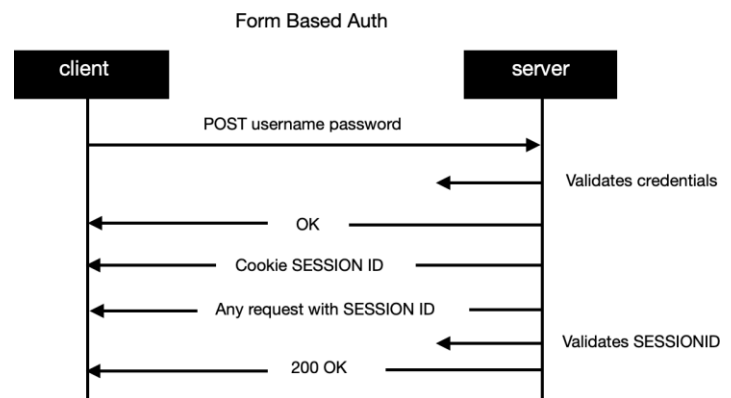


Fig. 3:Form based Authentication

V. Conclusion:

In this project, A user-friendly e-commerce application is developed .The application is capable to load on any web browser in seconds . Apache tomcat server is used to load a website .The outcome of project will be design a user-friendly and responsive web application which will load quickly and can have easy check-outs with maximum security . This prototype has possible use in day-to-day life. There is no time barriers in selling the products. One can log on the internet even at midnight and can sell products at a single click of mouse. An interactive user friendly and focused

website in the form of online shop can generate good business.

VI. References:

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