

E-shop – E Commerce and Management System

Athapaththu A.H.M.C.P¹, Jayashantha D.A.C.N², Herath H.P.N.U³, Dunusinghe A.V⁴, De Silva D.I⁵ and Samarasekara H.M.P.P.K.H⁶

¹Sri Lanka Institute of Information Technology Faculty of Computing, Department of Software Engineering, SRI LANKA

²Sri Lanka Institute of Information Technology Faculty of Computing, Department of Software Engineering, SRI LANKA

³Sri Lanka Institute of Information Technology Faculty of Computing, Department of Software Engineering, SRI LANKA

⁴Sri Lanka Institute of Information Technology Faculty of Computing, Department of Software Engineering, SRI LANKA

⁵Sri Lanka Institute of Information Technology Faculty of Computing, Department of Software Engineering, SRI LANKA

⁶Sri Lanka Institute of Information Technology Faculty of Computing, Department of Software Engineering, SRI LANKA

¹Corresponding Author: chamidupriyankara.sl@gmail.com

ABSTRACT

The main focus of the paper, “E-shop is an e-commerce web application designed for an online electronic store based on a client’s requirement. E-commerce, a fast-growing business trend over the last decade, and many companies switching to this since it is a supporting tool in marketing and business strategy to grow their businesses by transforming traditional business transactions into online transactions and making a good reputation on their brand as well. This application is a combination of a website where customers can place their orders and an administration management system where the admin can manage; he/she tasks related to the store.

The system is developed to make it easier for administrators as well to keep track of everyday activities including orders, deliveries, existing and new users, customer care services, products in the store, payments and reports, etc.

This essay discusses the steps involved in user management and registrations, placing orders, arranging deliveries of the placed orders, and payments related to orders. After considering the stocks available, administrators are able to accept or reject the order that the customer placed, and the status of the order, delivery, and payment will be updated to users by sending notifications and emails.

Keywords— Abstraction, E-commerce, MERN, Management, Requirements, Customer, Client, User Roles

I. INTRODUCTION

E-commerce is a one of the result of Globalization and Information technology. This change the business environment and helps to create new opportunities worldwide. Recent research done on E-commerce in different continents shows this e-commerce concept is becoming popular worldwide. [11]

This web application is launched by targeting local customers who love to do online shopping and save time, who consider the quality of the product, and price comparison with different brands.

This e-commerce web application solves the most

prominent problems faced by sellers, storekeepers, or businessmen due to the absence of online buying and selling systems. Among those,

Sales are able to be done only within a limited area.

1. Customer care is limited.
2. Time-consuming and data inconsistency
3. When moving to the top management level, they can’t get business decisions on time.
4. Since it is a manual method, there is a considerable percentage of inaccurate data. [1]

Especially due to the current situation across the world, people love to shop online, and this platform helps to satisfy that customer preferences as well.

Apart from the above-mentioned benefits, this online platform addressed the solutions for the problems caused by traditional shopping and maintaining a physical shop.

1.1 Benefits for Administrator

1. Data access and maintenance are easy than manual records
2. Data alteration and modifications are easy.
3. Timesaving.
4. Reduced manual work since it reduces cost.
5. Timely Report generation helps to analyze the data to get correct decisions on time
6. High accuracy, reliability

1.2 Benefits for Customer

1. Timesaving.
2. No expenses for traveling
3. User-friendly, reliable, and secure application.
4. Able to shop worldwide.

Below shows the diagrammatic representation (Figure 1.1) of the proposed application as a summary.

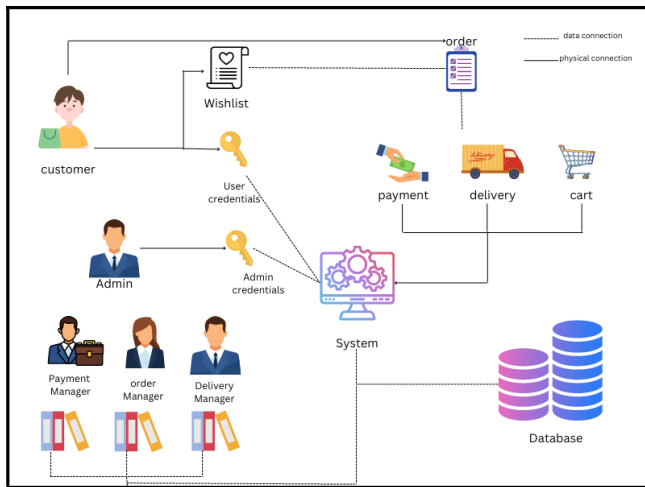


Figure 1.1: system overview

II. RELATED WORK

This section of the paper highlights the concept of e-commerce, the similarities, contradictions, and opinions on the existing e-commerce system with E-shop.

E-commerce and the internet are heavily geared toward industrialized nations. However, if it is, they can greatly aid developing nations appropriately as a desirable business objective. A revolution in company procedures is e-commerce [9] The concept of commerce as business dealings carried out between partners.

A developing idea is electronic commerce. describes how the purchasing and selling process works or product, service, and information exchange via the internet and computer networks. [10]

Since the E-shop consists of a website and a management system, it covers a considerable scope of requirements at once. Here, this system mainly focused on the security, and privacy of customers. A secure payment gateway which is payHere is used to deal with payments and it helps to encourage customers to do their payments through it. Also, email sending system and sms sending notification system added to give frequent updates, maintain good customer care service and interaction with the system. But this facility is not considered as important in other competitive e-commerce applications. [6][7]

JWT json web token, end-to-end encryption technologies also provides secure authentication while login to the system which is not applied in some e-commerce applications but those are important to secure users' privacy and data in some instances such as hackings, cybercrimes, cyber bullings.[7]

III. METHODOLOGY

For the development of the system, it is proposed to be developed in MERN Stack.Net Core (Windows Services) and RabbitMQ using service-oriented architecture environment such as Visual studio code and Visual studio. The methodology that will be applied in this project in the SCRUM agile methodology due to its agile environment that will allow those involved to interact continuously through the sprint, and then the agile development. Here, in this project, Azure board used as the project management tool. Selenium IDE and SonarQube are used as Testing tool.

Azure Board

This is a project management tool in which Software development teams can manage their software projects with the interactive and scalable tools provided by Azure Boards. It offers a wide range of capabilities, such as integrated reporting, calendar views, customizable dashboards, and native support for Agile, Scrum, and Kanban processes. Track the project's efforts, problems, and coding errors quickly and easily. Users can add, update, and filter user stories, issues, features, and epics using a variety of tools, one of which is the Kanban board displayed in the accompanying image. [5]

Selenium IDE and SonarQube

Selenium IDE is an extension that testers can add to the browser they used in testing. This is open-source record and playback test automation for web applications.

SonarQube, on programming languages for continuous inspection of code quality to do automatic reviews using static analysis of code to discover bugs, code smells.

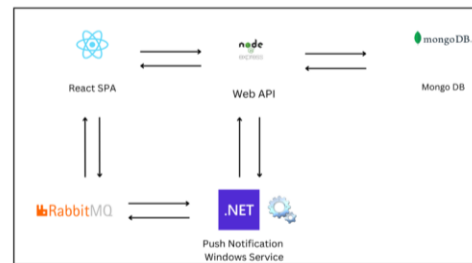


Figure 3.1: High level Architecture

This time, the system architecture makes clear that the constructed backend server will be used to process the data that has been received from the client application and provide the processed data back to the client application. The web service and the database are the two components that make up the server side. The REST API architecture is used by the web service, which has numerous functions to process data from the database and provide output that can be accessed by the application using the URL methods GET, POST, PUT, and DELETE. The database stores all of the information from the components of the e-shop

application, including user data, order data, delivery service data, and product data organized by category. The client's job is to input data into the server and show the server's processed data. To increase the effectiveness of sending the push notification, the application server side uses RabbitMQ and Windows Services.

Authentication from Client to Server

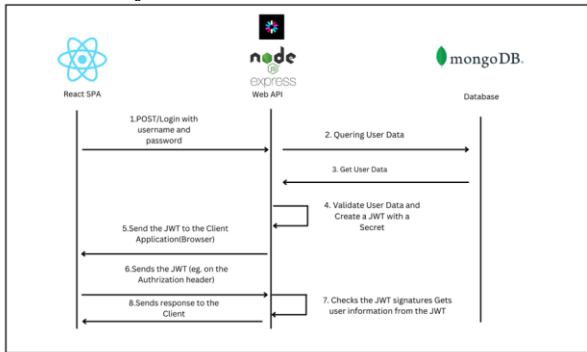


Figure 3.2: Authentication diagram

Every web application needs to be secure, thus developers must be sure to include secure authentication in their designs. JWT (JSON Web Token) is a method of authentication offered by the server. The authentication server typically creates and sends back JWT when a user logs in to a mobile application using his username and password. The next API call to the server is then transmitted along with this JWT.[1] Until it expires, or the user logs out of the application, JWT is still valid. The illustration of this procedure is shown in the diagram on Figure 3.2 below.

For the system server side handle the unit of works and CRUD operations used CQRS(command Query Responsibility Segregation) architecture .CQRS[2] was inspired by the open closed principle OCP and the concept of Command Query Responsibility Segregation (CQRS), all of which were mentioned in Bertrand Meyer's book Object-Oriented Software Construction. Simply stating that it is a system that divides the architecture into two components—command processing (write requests) and query processing—is the main principle (read request). Then, using various architectures, read and write on both sides can be accomplished to reach CQ goals (i.e., Command side, also known as C-side; Query side, also known as Q-side).Give an example of a straightforward planned system. to accomplish product removals and additions in order to evaluate its functionality. Figure 3.3 shows the general structure as follows: The image makes it very evident that CQRS separates read from write operations while reading data from a database using the QueryFacade and an API that may be a reporting database. The more complicated operations are transmitted to the

CommandBus through the Command, and a specialized CommandHandler deals with the request before generating the appropriate event, event persistence, and performing other operations through the EventBus-specific EventHandler.[3]

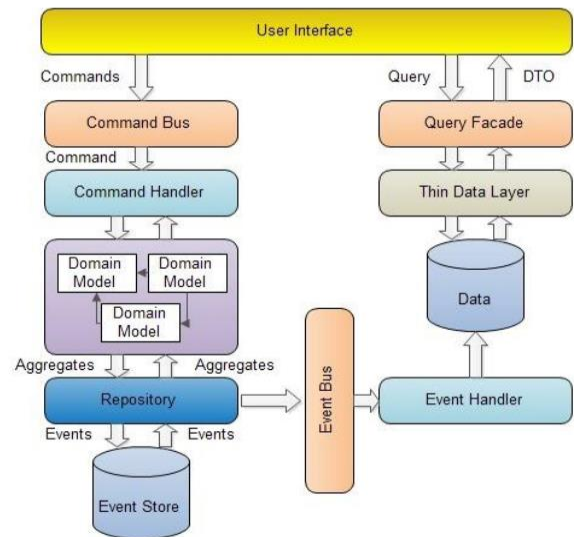


Figure 3.3: CQRS

IV. PROPOSED SYSTEM

After analyzing the functional and nonfunctional requirements, to build a successful system, developers identified five sub functionalities.

1. User Management
2. Order Management
3. Payment Management
4. Delivery Management
5. Product Management

Deviating from the traditional form submit method for customer care service, this system has been implemented with a chat bot which is an instant problem solver which perfectly matches with the modern technologies we have used with this application. It developed using Kommunicate and Dialogbox.[4] Kommunicate is live-chat and chatbots powered customer support software. Kommunicate allows you to add live chat on your website that enables users to chat with website visitors and customers using a beautiful chat widget.

Summary of the sequential procedure of the whole application can be shown as below (Figure 4.1). As mentioned in the early sections, this application is developed by mainly targeting two user roles namely admin and customer. In addition to that sub user roles also can be identified as an expansion of the role, admin.

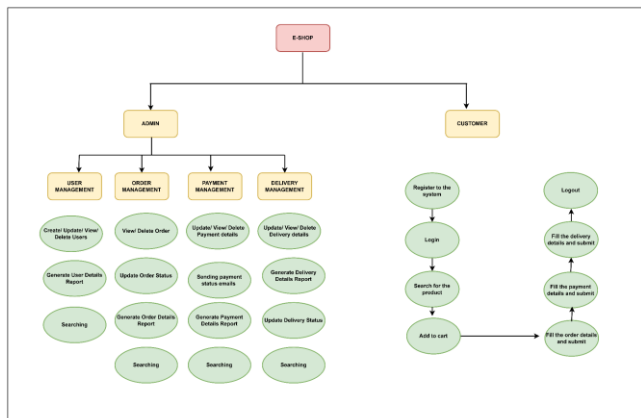


Figure 4.1: System flow chart

After successfully registering to the system, the user can log in to the system by providing username and password. but customers are provided with the opportunity to view only the website. Navigators (Navigation bar and sidebar) vary according to the type of user (user role). For the role of customer (Figure 4.2), after login to the system, a home page with a list of products is viewed. After adding products to the shopping cart, the system shows the total of the order. Next system navigates to order and payment user interfaces while validating the user inputs. This application includes a secure payment gateway for the card payments and delivery facility also included in this proposed system. Moving to order, payment and delivery management function, only the data entering is permitted with the customer. Status update, deleting unwanted, declined or rejected, summary view and report generation is done by admin or respective admin sub roles (Figure4.3). Administrator level user registration is done by admin and customers are able to register themselves. All transactions will be informed to the customer as a text message or email confirmation.

Moving to wireframe designing, this system is designed by following best practices of user interface engineering, considering user friendliness, user experience. Other than that, apart from client requirements, performance, scalability, speed, and maintainability are also considered as quality parameters. Primary focused, simple, meaningfully labeled user interfaces help users to interact with the system without any uncomfortable or disturbance. Also, the system uses server-side pagination data filtering logic to load the data. It ensures high performance of the application and reduces the server processing.

Moving to user interfaces and their purpose, here, when buying an item, the customer navigates to the payment page after entering the order details. When the payment is completed, the next step is to deliver the

ordered item. For that customer needs to enter delivery details and the system accepts the delivery after validating the details.

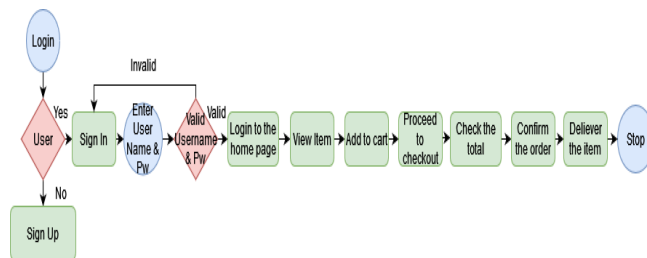


Figure 4.2: overall Customer Flow chart

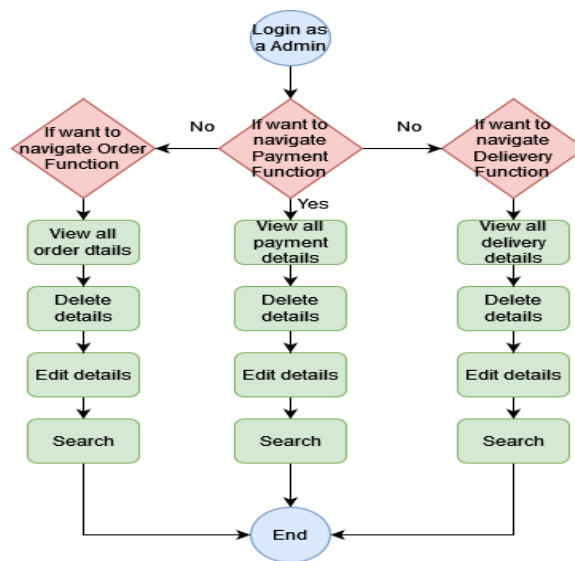


Figure 4.3: Overall admin Flow chart

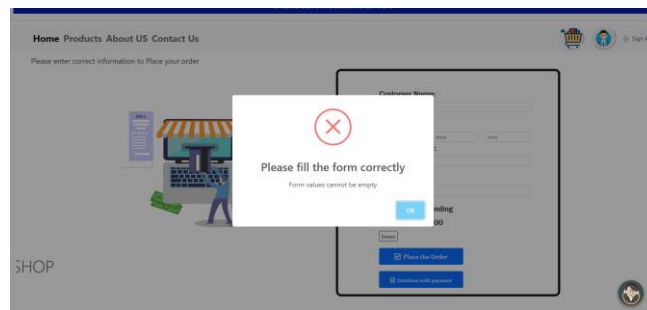


Figure 4.4: Order insert form - user interface

Purpose: - When the customer wants to buy a product, he needs to fill the order form. After entering the details of the customer, the place order button should be clicked. Since all input fields are validated, user should be filling this form correctly otherwise, a popup message will show "please fill the form correctly" (Figure 4.4)

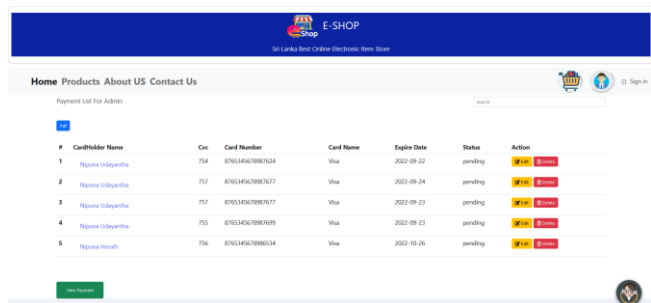


Figure 4.5: Payment summary table - user interface

Purpose: - After entering the customer's information, he/she navigates to the payment page. Validation is applied to two fields. They are Cvv and card numbers. After clicking the save button, the order will be placed successfully. System notifies the confirmation message to the customer.(Figure 4.5)

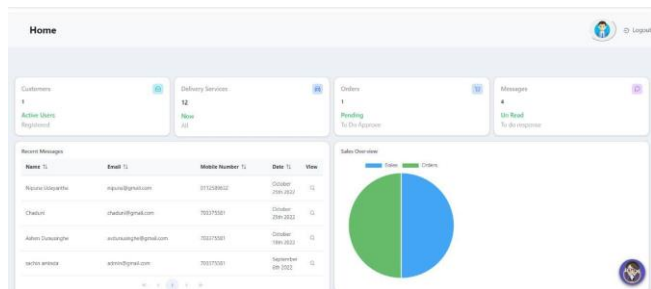


Figure 4.6: Statistic page - user interface

Purpose: -After entering the customer's delivery details, Admin can take care of all the information here. Things like pending orders, unread messages, delivery history can also be viewed as a chart. (Figure 4.6)

V. DISCUSSION

This section of the paper includes the key findings of methodology, testing methods, project management tool, and version control system that was used while implementing the web application.

As key findings, since this system contains clean architecture, the scalability of the server is high. The current system uses MongoDB as a database. As per future requirements, the database can be changed or expanded. Since important logic such as pagination and filtration are used for the system, the user-friendliness of the application is increased. Data is segmented and retrieved accordingly.

i) Azure Board

This overall project Implementation consists of 2 sprints which are spring 1 and spring 2, 2-month time

period each. After 4 months, able to achieve 100% completeness of the project. Below diagram (Figure 5.1) shows the completed tasks in board.

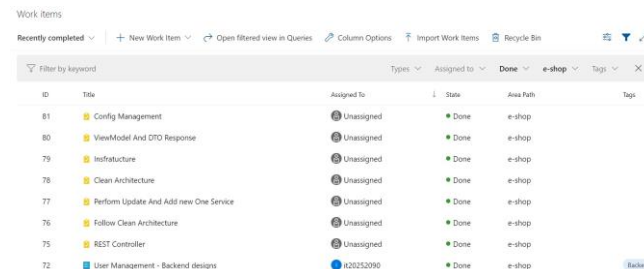


Figure 5.1: Completed Tasks

ii) Selenium IDE

The below attached image (Figure 5.2) shows the successfully executed test case designed for login function.

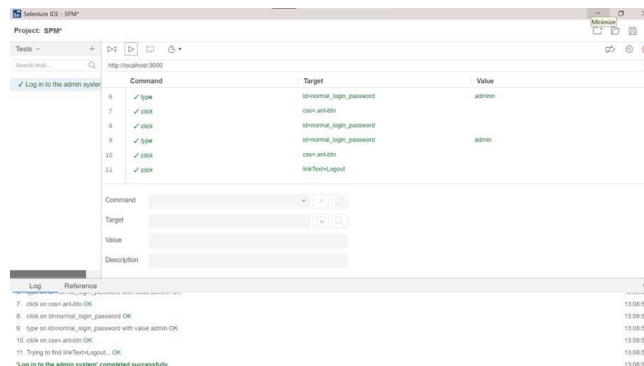


Figure 5.2: Successfully completed selenium output

iii) SonarQube

After testing using this, I was able to discover that the project contains zero bugs, blockers and major issues. 70% code coverage is detected after testing with this tool.

The attached image (Figure 5.3) below shows the successful implementation of the project Overview status of analyzed and Project overview.

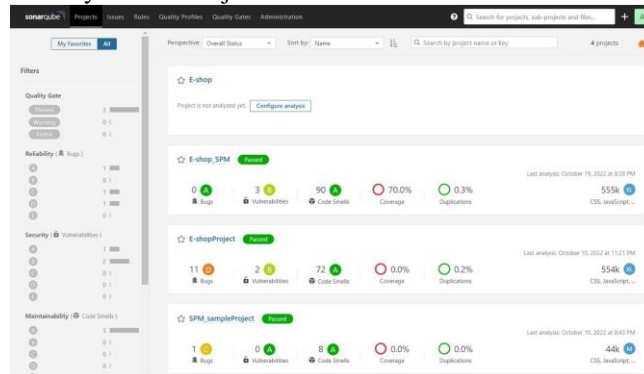


Figure 5.3: SonarQube Projects

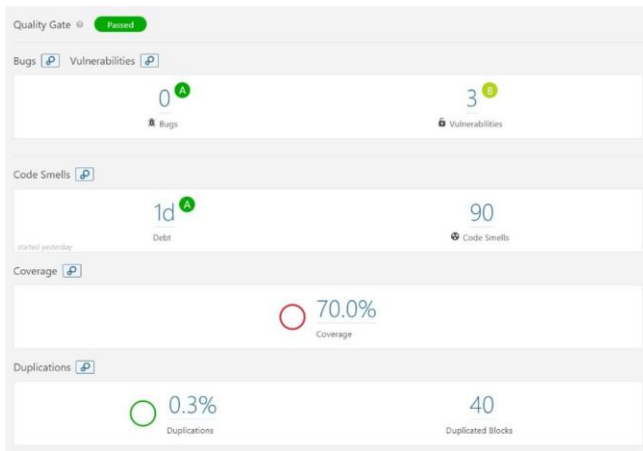


Figure 5.4: Project overview

VI. CONCLUSION

Finally, as a conclusion, this online electronic items shop has succeeded in its purpose. A lot of effort has been spent to complete this project. It has significantly increased the company's operations. Previously visiting the shop and asking for information about the relevant product, now everything has been transferred to computerized processes so that the business has been able to run more quickly. In addition, users now have access to a wide range of communication options. As all earlier work has been replaced by electronic work. As a result, purchasing goods can be done more effectively from home. New technology has brought many benefits to the business.

By introducing this web application, E-shop clients are able to find solutions for the problems they face and help to reduce the minimum level of paperwork. Data can be accessed and retrieved with one click. Both the complexity and the cost of data handling are reduced. It processes data more quickly and efficiently. It requires less time. There is more transparency in operations. Users can communicate more effectively.

As further development it is good to have GPS location tracking via integrated API. Here the system able to track the delivery location, estimated delivery time and delivery information when the product is delivered.

ACKNOWLEDGMENT

The authors would like to express their gratitude to all the lecturers and instructors of the third-year Software Project Management (SPM - SE3080) module at the Sri Lanka Institute of Information Technology (SLIIT) for the guidance and background knowledge provided for writing this paper. Apart from that, huge thanks to all the seniors

and peers for their support and a sincere appreciation of all the authors of refereed research papers, articles, and websites. The contribution of all the four authors is highly appreciated and valued.

REFERENCES

- [1] THE MODEL FOR STORING TOKENS IN LOCAL STORAGE (COOKIES) USING JSON WEB TOKEN (JWT) WITH HMAC (HASH-BASED MESSAGE AUTHENTICATION CODE) IN E-LEARNING SYSTEMS Syabdan Dalimunthe1* , Joeahsyah Reza2, Asep Marzuki3 Department of Computer Engineering 1,2,3, Politeknik Caltex Riau, Indonesia
- [2] [2]Betts D, Dominguez J, Melnik G, et al. Exploring CQRS and Event Sourcing: A journey into high scalability, availability, and maintainability with Windows Azure[J]. 2013.
- [3] Improvement and Implementation of a High Performance CQRS Architecture ZhangLong Xi'an Eurasia University, Xi'an, Shaanxi, 710065, China dir_zl@qq.com
- [4] The Use of Chatbots in Digital Business Transformation: A Systematic Literature Review Andrej Miklosik1, Nina Evans2, Athar Mahmood Ahmed Qureshi3 1Marketing Department, Faculty of Management, Comenius University in Bratislava, Bratislava, 83104 Slovakia 2University of South Australia, UniSA STEM, Mawson Lakes Campus, Mawson Lakes Blvd, Mawson Lakes SA 5095, Australia 3University of South Australia, UniSA Business, City West Campus, 61-68 North Terrace, Adelaide SA 5000, Australia Corresponding author: Andrej Miklosik (e-mail: miklosik4@uniba.sk)
- [5] Visualizing and Reporting in Azure Boards September 2019, DOI:10.1007/978-1-4842-5046-4_6 In book: Hands-on Azure Boards (pp.189-222) Authors:Chaminda Chandrasekara, Pushpa Herath
- [6] E-COMMERCE RESEARCH AND APPLICATIONS A PROPOSAL FOR CLASSIFICATION AND AN UPDATED LITERATURE REVIEW December 2016INTERNATIONAL REFEREED JOURNAL OF MARKETING AND MARKET RESEARCHES DOI:10.17369/UHPAD.2016923644 Authors: Kasim Baynal - Kocaeli University Ali İhsan Boyacı - Kocaeli University

- [7] Personalized E-Commerce Applications with Reports Feature
Safitri Juanita, Muhamad Arsyhan and Wiwin Windihastuty
Universitas Budi Luhur
- [8] Chandrasekara, Chaminda & Herath, Pushpa. (2019). Hands-on Azure Boards: Configuring and Customizing Process Workflows in Azure DevOps Services. 10.1007/978-1-4842-5046-4.
- [9] Ohidujjaman, et al (2013). "E-commerce Challenges, Solutions and Effectiveness Perspective Bangladesh". International Journal of Computer Applications, Vol. 70(9). pp. 9-17.
- [10] Global Journal of Management and Business Research: B
Economics and Commerce
Volume 16 Issue 1 Version 1.0 Year 2016
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Electronic Commerce: A Study on Benefits and Challenges in an Emerging Economy
- [11] A comprehensive review on e-commerce research Cite as: AIP Conference Proceedings 2016, 020069 (2018); <https://doi.org/10.1063/1.5055471> Published Online: 27 September 2018 Vivian Khoo, Aidi Ahmi and Ram Al-Jaffri Saad