

Design and Construction of a Website-Based E-Commerce Application for Bamboo Crafts for Belega Village, Gianyar Regency

Dicky Umardhani^{1*}, Putu Wira Buana², Fajar Purnama³

¹²³ Udayana University, Indonesia

^{1*} ddickyumardhani@gmail.com, ² wbhuana@it.unud.ac.id, ³ fajarpurnama@unud.ac.id

Address: 86G9+RJV, Jalan P.B. Sudirman, Dangin Puri Klod, Kec. Denpasar Bar., Kota Denpasar, Bali 80234

Author correspondence: ddickyumardhani@gmail.com

Abstract. The development of information and communication technology in Indonesia has grown significantly over the past few years. Thus, there are many opportunities to digitize the business process of a business or business ecosystem. One of them is in the field of digital economy by adapting business processes into a digital platform, such as designing an e-commerce platform in a village that has commodities in it so that related commodities can increase the visibility of their products. This research uses Belega Village as a case study location considering that this village has a commodity in the form of bamboo crafts. Research was conducted to build a web-based bamboo handicraft e-commerce application that would be expected to increase product visibility. The application itself is built using the Agile Development method using the sprint model. This application is built with a microservice architecture with Express.js technology as a backend service and Next.js to create client applications and PostgreSQL as a DBMS. The result of this research is a web-based e-commerce application that is expected to increase the visibility of products from bamboo crafts from Belega Village.

Keywords: E-Commerce, Bamboo Crafts, Belega Village, Next.js, Express.js

1. INTRODUCTION

The rapid development of technology has a huge impact on various aspects of human life. The impact of the very rapid development of technology is a very significant increase in the need for information. The main solution to overcome the above challenges is to adopt technology. This is evident from the increasing number of people using online shopping platforms, including in rural areas. Belega Traditional Village is a village located in Blahbatuh District, Gianyar Regency. This village has a long history of bamboo crafts which are the main product of the village. However, along with changes in the times and technology, the Belega traditional village must adapt to remain relevant and competitive. One effort that can be made is to digitize the marketing of bamboo products.

The rapid development of information and communication technology has now opened up new opportunities for the Belega traditional village to develop its market and increase the visibility of its bamboo products. The rapid growth of e-commerce and the increasing use of mobile devices present great opportunities to reach a wider audience, including the global market. The purpose of this final project is to develop an online trading system and web-based mobile application specifically for the Belega traditional village. This system will be the main means of transforming the commodity marketing process in rural areas into digital, including

various steps such as internet sales, promotions, stock management, electronic payments, and other required functions. In developing this online trading system, we will use various latest software development technologies, including modern programming languages, web development frameworks, and the latest mobile technologies. This is done to ensure that the system has optimal performance, an attractive appearance, and a high level of security.

The developed e-commerce platform is expected to be able to utilize wider market potential, increase the income of local bamboo craftsmen, while preserving cultural heritage and its transformation in the digital era. This initiative is also expected to inspire other village communities to carry out similar transformations, which aim to improve the local economy and promote local culture through information technology. Thus, the development of an e-commerce platform in the Belega traditional village is not only a step towards better economic growth but also an example for other village communities to implement similar steps before the digital technology era develops further.

2. RESEARCH METHODS

The system development method that will be used in this study uses the Scrum Methodology or commonly known as Scrum. Scrum is an iterative method that is included in the Agile Software Development method on how to organize project management and implementation and Scrum can be used to develop projects ranging from software, website, hardware, marketing, to event planning. The scrum method is a software development method that focuses on strategy, flexibility and speed in system development. In its development it will be divided into mutually supportive units. The stages in the scrum method are carried out in several steps, namely creating a product backlog, sprint planning, daily scrum, sprint review, and the last is sprint retrospective.(Yudhi Yahya et al., 2021).

scrum in development E-Commerce Application on Belega Village Information System, Gianyar Regency Based on Website. The following is an explanation of the stages of scrum method development.

Product Backlog

According to (Pratama et al., 2022) Product Backlog is a priority list of work needed to improve the product to be worked on by the scrum team. The list contains a description of the desired or expected functionality in the final product. The list is updated continuously and sorted by the highest priority scale. The list consists of several types such as features, bugs, technical work and team knowledge acquisition where these items are usually expressed in user stories.

Sprint Planning

Sprint Planning is one of the activities in the Scrum framework that will be carried out by the Scrum team to plan each work to be done during the next sprint. In this activity, the scrum team will determine the Sprint Goal, which is the goal to be achieved during the Sprint. In addition, the scrum team will also identify the work to be completed during the sprint and create a Sprint Backlog, which is a list of priority work needed to achieve the Sprint Goal. Sprint Planning is done in collaboration with all members of the scrum team and is directed by the Scrum Master.

Daily Scrum

Daily Scrum is a short meeting held every day for 15 minutes to discuss the progress of the work done by the development team during the sprint. The purpose of the daily scrum is to ensure that the team remains on track to achieve the sprint goal.

Sprint Review

Sprint Review is a meeting held to review the work that has been done during the sprint. This meeting is attended by the development team, stakeholders, and anyone interested in the project. The purpose of the sprint review is to get feedback from stakeholders about the work that has been done, so that the development team can make necessary adjustments.

Sprint Retrospective

Sprint Retrospective is a meeting held to review the work process that has been carried out during the sprint. This meeting is attended by the development team, and anyone interested in the project. The purpose of the sprint retrospective is to identify things that went well, things that can be improved, and plan corrective actions for the next sprint.

3. RESULTS AND DISCUSSION

A general description of the system design that will be built using the REST API architecture using the Scrum Methodology development method will be described in the System Overview. In mobile-based applications, sellers can only confirm orders for orders made by buyers.

System Overview

Website-based e-commerce application for bamboo crafts for Belega Village, Gianyar Regency have a general overview of the system with the aim of modeling the system created in

general and is expected to make it easier to provide information about how the system will be formed.

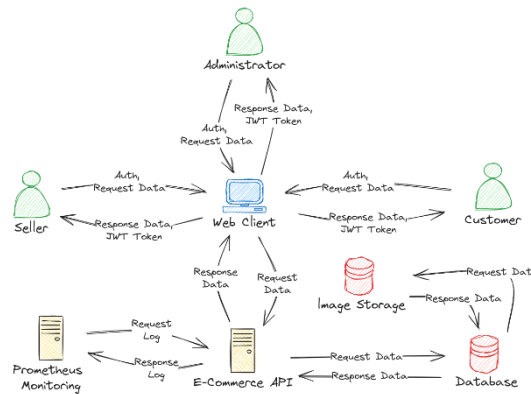


Figure 1. System overview

Figure 1 depicts the system bamboo craft e-commerce application for Belega Village, Gianyar Regency based on website. This system has two entities, namely sellers and buyers. The system development process begins with creating a database using PostgreSQL and connecting it to image storage. Then, an API is created using the Express.js framework. Finally, mobile application users, namely sellers and buyers, access login data according to the roles assigned by RBAC to the API.

Business Process

A business process, in its true sense, is a series of interrelated and systematically arranged activities and tasks to achieve the goals set for a business.

The application developed through this research has become part of the business process in Belega Village. To carry out buying and selling transactions, this application can connect the necessary communication between buyers and sellers.

a. Business Process Authentication Module

This Business Process Authentication Module focuses more on buyer account management. Visitors or application users will receive a purchase role directly as a result of the registration process. Figure 2 shows the business flow of the authentication management process.

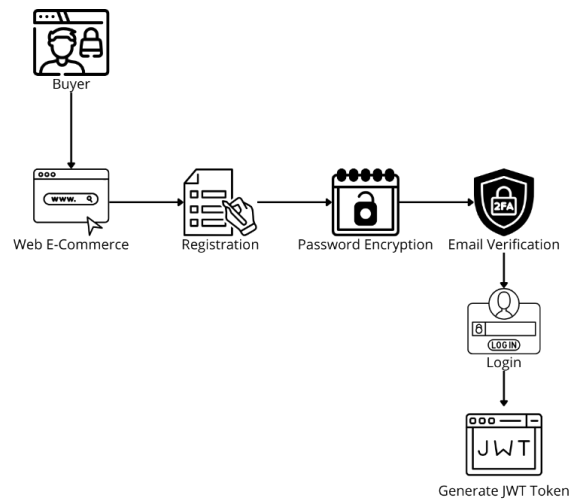


Figure 2. Business Process Authentication Module

The main process of the Authentication Module is to register a visitor account to access the e-commerce application. The following is a detailed explanation regarding Business Process Authentication Module.

The application user opens the E-Commerce application. When they have entered the application, visitors can register an account by filling in the requested personal data. After registering by filling in their personal data and creating a password, visitors need to verify their email using the OTP code that will be sent to the email they registered earlier. Visitor passwords are encrypted during registration. The encryption process itself is carried out using the Hash256 algorithm to protect accounts registered in the system.

All features in the E-Commerce application can be accessed after the visitor is verified. After the registered account has been verified, the visitor will become a buyer. The buyer must first log in with an account that they already have and has been verified. This is very important because the E-Commerce application has a security layer that relies on JWT tokens. The token can only be obtained by buyers who have logged in using a verified account.

b. Business Process Buyer Profile Module

This Business Process Buyer Profile Module can be used by buyers, if the buyer wants to change the buyer's biodata, then the buyer must fill in the address data to shop on the website. A complete illustration related to the buyer profile business process can be seen in Figure 3.

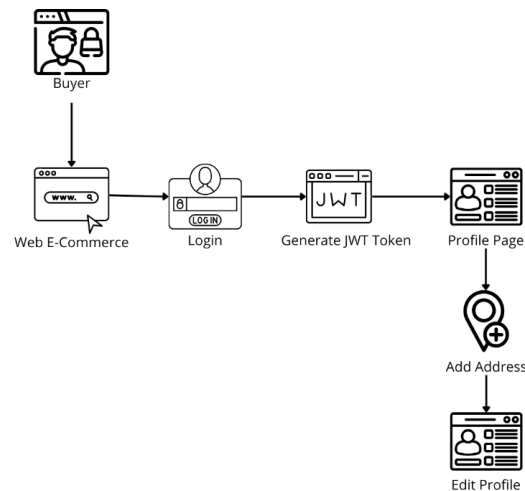


Figure 3. Business Process Buyer Profile Module

In the Business Process Buyer Profile Module, users are directed to the profile page, where they can view and manage their account information. On this page, users have the option to add a shipping address that will be used when making purchases. They can also edit their profile, such as changing their name or updating their contact information.

c. Business Process Cart Module

This Business Process Cart Module can be used by buyers, if the buyer wants to add, delete, edit quantity, and checkout products in the cart page on the website. A complete illustration related to the business process cart module can be seen in Figure 4.

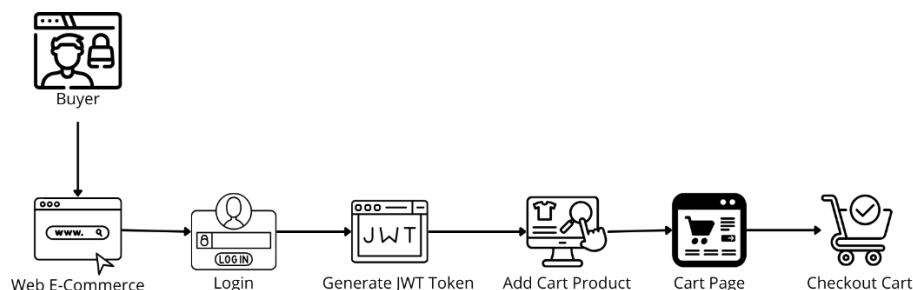


Figure 4. Business Process Cart Module

In the Business Process Cart Module, users want to buy products, they can browse the product pages on the e-commerce website and select the desired items. After selecting, they can add them to the shopping cart. Users can then view the cart page to review the items that have been added, including the quantity and total price. When ready to complete the order, users will be directed to the checkout page where they can complete the payment process. With that, the purchase is successfully completed, and the system will process the order according to the information that the user has filled in, such as the shipping address.

d. Business Process Seller Registration Module

This Business Process Seller Registration Module can be used by buyers, if the buyer wants to register as a seller and must fill out the store registration form by generating a store on the website. A complete illustration related to the business process seller registration module can be seen in Figure 5.

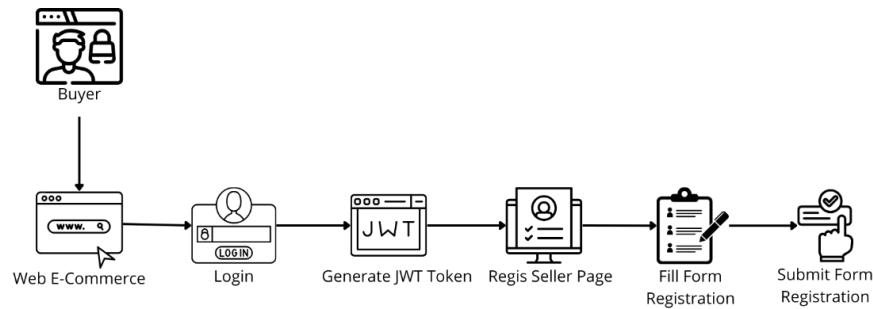


Figure 5. Business Process Seller Registration Module

In the Business Process Seller Registration Module, the first step taken by the user is to open the e-commerce website. After successfully accessing the main page, he immediately logs in to his account by entering the correct username and password. Once the login process is successful, the system automatically generates a JWT (JSON Web Token) token that functions as an authentication key. With this token, the buyer has full access to proceed to the next step, namely the seller registration page. On the registration page, the user fills in the form that must be filled in to continue the registration process. The system then verifies all the data that has been input, and in a short time, the user receives a notification that the registration as a seller has been successful.

e. Business Process Order Module

This Business Process Order Module can be used by buyers, if the buyer wants to register as a seller and must fill out the store registration form by generating a store on the website. A complete illustration related to the business process seller registration module can be seen in Figure 6.

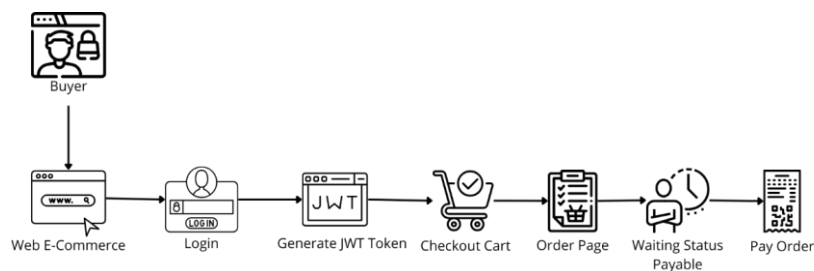


Figure 6. Business Process Order Module

In the Business Process Order Module, users access the homepage of the e-commerce website and log in using their account. Once successfully logged in, the system automatically generates a JWT (JSON Web Token) token that is used to authenticate the user session. With this token, users have secure access to continue the purchase process. Users can then access the shopping cart and shoppers are directed to the order page to review and confirm their order details. After confirming the order, the order status will change to "awaiting payment" in the system. At this stage, users are asked to make payment according to the methods available on the e-commerce website. Once the payment is successful, the transaction process is complete, and users will receive a confirmation that their order is being processed for delivery.

f. Business Process Rating Module

This Business Process Rating Module can be used by buyers, if the buyer wants to give a review and give a score after the product arrives or reaches its destination. A complete illustration related to the business process rating module can be seen in Figure 7.

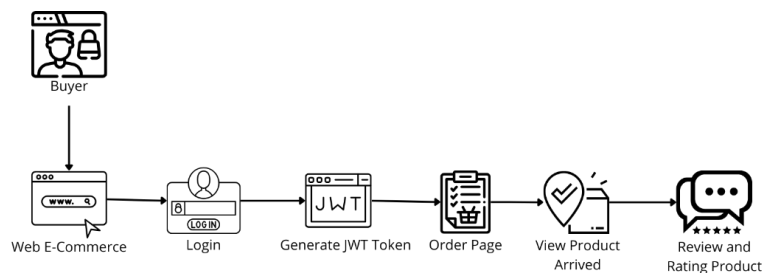


Figure 7. Business Process Rating Module

In the Business Process Rating Module, users access the Home page of the e-commerce website and log in with their account. Once successfully logged in, the system automatically generates a JWT (JSON Web Token) token that is used to authenticate the user session. With this token, users have secure access to perform activities on the web. Users can go to the order page to check previously placed orders or confirm that the order has arrived. Finally, users can provide ratings and reviews for related products.

Black Box Testing

In building a comprehensive system or application, various tests are certainly needed to ensure that the system can meet the planned business processes. The results of the Blackbox testing carried out on the Bamboo Craft e-commerce application, which is based on the Website, can be seen here.

- a. Authentication Mo Thank you very much for this opportunity to submit my manuscript for review. I greatly appreciate your time and attention. dule

The following are the results of Blackbox Testing that has been carried out on the application authentication module that has been carried out. The results of Blackbox Testing will be displayed through Table 1 below.

Table 1. Authentication Module

Number	Scenario	Expected results	Conclusion
A001	User logged in with the wrong account	- The system displays an error message	- Fulfilled
A002	User login with the correct account	- The system displays the website landing page	- Fulfilled
A003	User register with incomplete data	- The system displays an error message in an empty field.	- Fulfilled
A004	User register an account with complete data	- The system displays a successful registration message.	- Fulfilled
A005	User reset password with correct email	- The system displays the sent email message. - E-mailer inbox - The system displays a success message	- Fulfilled
A006	User reset password with wrong email	- The system displays an error	- Fulfilled
A007	User change password	- The system displays a message that the password change was successful.	- Fulfilled
A008	User logout of the application	- The system displays an alert that the logout was successful. - The system displays the login page.	- Fulfilled

- b. Buyer Profile Module

The following are the results of Blackbox Testing that have been carried out on the application buyer profile module that has been carried out. The results of Blackbox Testing will be displayed through Table 2 below.

Table 2. Buyer Profile Module

Number	Scenario	Expected results	Conclusion
B001	User view user profile.	- The system displays a column containing user profile data.	- Fulfilled
B002	User changing user profiles by using data that does not comply with validation.	- The system displays an error message according to the failed validation.	- Fulfilled
B003	User change the user profile by using data that matches the validation.	- The system displays a message that the profile data change was successful.	- Fulfilled

c. Cart Module

The following are the results of Blackbox Testing that has been done on the application cart module that has been done. The results of Blackbox Testing will be displayed through Table 3 below.

Table 3. Buyer Profile Module

Number	Scenario	Expected results	Conclusion
C001	User add product to cart.	- The system displays that the product data is already in the cart.	- Fulfilled
C002	User remove one product from the cart.	- The system displays a message that the product data has been deleted from the cart.	- Fulfilled
C003	User remove all products from cart.	- The system displays a message stating that all products have been removed from the cart.	- Fulfilled
C004	User checkout the selected products in the cart.	- The system displays a message that the product was successfully checked out.	- Fulfilled

d. Seller Registration Module

The following are the results of Blackbox Testing that has been carried out on the application seller registration module that has been carried out. The results of Blackbox Testing will be displayed through Table 4 below.

Table 4. Seller Registration Module

Number	Scenario	Expected results	Conclusion
D001	User register to become a seller.	- The system displays the store registration form	- Fulfilled
D002	User fill in the store name biodata form.	- The system displays the address form	- Fulfilled
D003	User fill in the store address biodata form.	- The system displays the KTP form	- Fulfilled
D004	User fill in the store KTP form as seller identity.	- The system displays successful seller registration.	- Fulfilled

Order Module

The following are the results of Blackbox Testing that has been carried out on the application order module that has been carried out. The results of Blackbox Testing will be displayed through Table 5 below.

Table 5. Order Module

Number	Scenario	Expected results	Conclusion
E001	User see the existing order list	- The system displays a column containing order list data.	- Fulfilled
E002	User view order list by status	- The system displays a column containing order list data with the selected status.	- Fulfilled
E003	User view existing order details	- The system displays detailed order data according to what the User has selected.	- Fulfilled
E004	User view order list with payable status	- The system displays a column containing order list data with payable status.	- Fulfilled
E005	User choose the shipping service used to send the buyer's goods.	- The system displays on the order details page a Pay Now button.	- Fulfilled
E006	User make payments using a payment gateway.	- The system displays that the payment was successful.	- Fulfilled
E007	User check the status so that the order status becomes packing.	- The system displays the status change to packing.	- Fulfilled
E008	User view order list with shipped status	- The system displays a column containing order list data with shipped status.	- Fulfilled
E009	User make status changes to items that have arrived.	- The system displays on the order detail page that the order status has changed to arrived.	- Fulfilled
E008	User view order list with shipped status	- The system displays a column containing order list data with shipped status.	- Fulfilled
E009	User make status changes to items that have arrived.	- The system displays on the order detail page that the order status has changed to arrived.	- Fulfilled
E010	User see the order list with arrived status.	- The system displays a column containing order list data with arrived status.	- Fulfilled
E011	User see order details with status arrived	- The system displays the order details page with the status arrived.	- Fulfilled
E012	User view the invoice resulting from the buyer's purchase.	- The system displays an invoice page containing the detailed order invoice.	- Fulfilled
E013	User perform invoice download on user device.	- The system downloads and displays the buyer's invoice pdf file.	- Fulfilled

e. Rating Module

The following are the results of Blackbox Testing that have been carried out on the application rating module that has been carried out. The results of Blackbox Testing will be displayed through Table 6 below.

Table 6. Rating Module

Number	Scenario	Expected results	Conclusion
F001	User see product ratings.	- The system displays a product page containing ratings from buyers.	- Fulfilled
F002	User select a product from the store you want to see reviews of.	- The system displays the seller profile page.	- Fulfilled
F003	User see product reviews from buyers who purchased from the store of choice.	- The system displays the buyer review page based on the store.	- Fulfilled
F004	User see the order list with arrived status.	- The system displays a column containing order list data with arrived status.	- Fulfilled
F005	User see order details with status arrived	- The system displays the order details page with the status arrived.	- Fulfilled
F006	User submit reviews and ratings using appropriate data.	- The system displays that the review and rating were successfully submitted.	- Fulfilled

f. Store Module

The following are the results of Blackbox Testing that has been done on the application store module that has been done. The results of Blackbox Testing will be displayed through Table 7 below.

Table 7. Store Module

Number	Scenario	Expected results	Conclusion
G001	User access the store dashboard.	- The system displays the store dashboard page.	- Fulfilled
G002	User re-access the buyer page.	- The system displays the buyer page.	- Fulfilled
G003	User access the product store list.	- The system displays a list of store products.	- Fulfilled
G004	User add products you want to sell.	- The system displays a message that the product data was successfully added.	- Fulfilled

G005	User access the transaction store list.	- The system displays a list of store transactions.	- Fulfilled
G006	User make confirmation when the transaction status is pending.	- The system displays a message that the transaction was successfully confirmed.	- Fulfilled
G007	User make a cancellation when the transaction status is pending.	- The system displays a message that the transaction was successfully cancelled.	- Fulfilled
G008	User access the store bank account list.	- The system displays a list of store bank accounts.	- Fulfilled
G009	User add a bank account to the store.	- The system displays a message that the bank account was successfully added.	- Fulfilled
G010	User make bank account edits on the store.	- The system displays a message that the bank account has been changed successfully.	- Fulfilled
G011	User access the store payout history list.	- The system displays a list of payout history.	- Fulfilled
G012	User make a payout request by filling in the correct data.	- The system displays a message that the payout request data has been successfully added.	- Fulfilled
G013	User access the store profile form.	- The system displays the store profile form.	- Fulfilled
G014	User make changes to the store profile data.	- The system displays a message that the data store profile has been successfully changed.	- Fulfilled

4. CONCLUSION

In this study, it can be concluded that the E-Commerce application for Belega Village, Gianyar Regency Based on Website developed with the Next JS framework has been able to run well displaying data and features according to the access rights of each role on the user. API development uses the Express JS framework which facilitates data exchange between website applications and databases. The database used in the study is PostgreSQL which aims to be a system data storage.

E-Commerce Application for Belega Village, Gianyar Regency, Website Based created with the aim of making it easier for bamboo craft artisans in Belega Village, Gianyar Regency to carry out bamboo craft buying and selling transactions.

E-Commerce Application for Belega Village, Gianyar Regency Based on Website using Next JS framework was built with the aim of facilitating bamboo craft artisans in Belega Village. Therefore, this study develops an e-commerce application that focuses on the convenience of sellers and buyers of bamboo crafts, allowing them to search, order products, and make payments more efficiently through the payment gateway. The application consists of several features such as authentication, ordering bamboo craft products, registering as a seller, ordering pre-order items, giving ratings to the products ordered.

BIBLIOGRAPHY

- Baehaqi, A., Basit, MS, Indrajit, RE, & Kurniawan, RD (2023). FRONT END LEARNING MANAGEMENT SYSTEM DEVELOPMENT USING THE NEXTJS FRAMEWORK. *Jurnal Teknik Informatika (Jutif)*, 4(4), 899–911. <https://doi.org/10.52436/1.jutif.2023.4.4.1273>
- Bamigbala, T., & Safonova, I. (2022). DIGITAL TRANSFORMATION OF SOFTWARE ENGINEERING OPERATIONAL MODELS Tools, platforms, and cloud services. <https://doi.org/10.13140/RG.2.2.29221.17129>
- Chen, X., Ji, Z., Fan, Y., & Zhan, Y. (2017). Restful API Architecture Based on Laravel Framework. *Journal of Physics: Conference Series*, 910(1). <https://doi.org/10.1088/1742-6596/910/1/012016>
- Gede, P., Cipta Nugraha, S., Putu, I., Indrawan, Y., Kadek, I., & Asmarajaya, A. (2022). DESIGN OF WEBSITE-BASED E-COMMERCE INFORMATION SYSTEM (CASE STUDY OF A COMPUTER SHOP IN DENPASAR). *INSERT: Information System and Emerging Technology Journal*, 3(1), 53.
- Hendarsyah, D., Tinggi, S., Ekonomi, I., & Bengkalis, S. (2019). E-COMMERCE IN THE ERA OF INDUSTRY 4.0 AND SOCIETY 5.0 (Vol. 8, Issue 2). <https://ejournal.stiesyariah Bengkalis.ac.id/index.php/iqtishaduna>
- Hermawan, I., Reniawaty, D., Pramuditha, P., & Fudsyi, MI (2022). E-Commerce Training to Get Business Opportunities for LP3I Bandung Polytechnic Students Post Covid 19 Pandemic (in collaboration with UMKM Kiri huci as an e-commerce trainer). In *ATRABIS: Journal of Business Administration* (Vol. 8, Issue 1).
- Jang, D., Jhala, R., Lerner, S., & Shacham, H. (2010). An empirical study of privacy-violating information flows in JavaScript web applications. *Proceedings of the ACM Conference on Computer and Communications Security*, 270–283. <https://doi.org/10.1145/1866307.1866339>
- Jubhari Phie Joarno, R., Fajar, M., Yunus, A., Informasi, S., & Kharisma Makassar, S. (2022). IMPLEMENTATION OF PROGRESSIVE WEB APPS ON THE GETHELP WEBSITE USING NEXT.JS. <https://jurnal.kharisma.ac.id/kharismatech/>
- Meilinda, N. (2018). *SOCIAL MEDIA ON CAMPUS: Study of the Role of Social Media as a Media for Disseminating Academic Information to Students in the Communication*

- Science Study Program, FISIP UNSRI. In The Journal of Society & Media (Vol. 2, Issue 1). <https://journal.unesa.ac.id/index.php/jsm/index>
- Molina, JI, Pelipus Malese, L., & Nomate, DW (2022). Design of E-Commerce System for Bamboo Craft Products. Scientific Journal of Wahana Pendidikan, 8(21), 707–715. <https://doi.org/10.5281/zenodo.7703273>
- Pratama, S., Ibrahim, S., & Reybaharsyah, MA (2022). INFORMATICS AND TECHNOLOGY (INTECH) Use of the Scrum Method in Forming a Web-Based Warehouse Storage Information System. INTECH JOURNAL, 3(1), 27–35. <https://journal.unbara.ac.id/index.php/INTECH/article/view/1192/835>
- Priyatna, B., Lia Hananto, A., Nova, M., Information System Studies, P., & Buana Perjuangan Karawang, U. (2020). Application of UAT (User Acceptance Test) Evaluation Model in Minggon E-Meeting Software Development. In SYSTEMATICS (Vol. 2, Issue 3).
- Roy Thomas Fielding. (2000). DISSERTATION_Architectural Styles and the Design of Network-based Software Architectures.
- Suprpto, A., & Sasongko, D. (2021). WEBSITE PERFORMANCE EVALUATION BASED ON LOAD AND STRESS TESTING USING LOADIMPACT (CASE STUDY OF IAIN SALATIGA WEBSITE). In Jurnal Ilmiah NERO (Vol. 6, Issue 1). <https://iainsalatiga.ac.id>
- Windane, W. (2021). ANDROID-BASED FISAGO.CO SHOP E-COMMERCE. Journal of Informatics and Software Engineering (JATIKA), 2(3), 285–303. <http://jim.teknokrat.ac.id/index.php/informatika>
- Yudhi Yahya, F., Rose Irawati, A., Yusman, M., Computer Science, J., Mathematics and Natural Sciences University of Lampung Bandar Lampung Jl Ir Sumantri Brojonegoro, F., Meneng, G., Rajabasa, K., & Bandar Lampung, K. (2021). DEVELOPMENT OF INTEGRATED INFORMATION SYSTEM OF FAMILY AND MIPA UNIVERSITY OF LAMPUNG (SIMIPA) USING SCRUME METHOD. In Jurnal TEKNOINFO (Vol. 15, Issue 1). <https://ejurnal.teknokrat.ac.id/index.php/teknoinfo/article/view/1041>