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Geographic Segmentation using Application Programming Interface (API) Geolocation on E-Marketplace Development

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Abstract. Purbalingga is one of the regencies in the province of Central Java with many muffler artisans and is the largest exhaust producer in Indonesia. In this study, the development of an e-marketplace application will be carried out by implementing a geolocation Application Programming Interface (API). The geolocation API is used to detect the location of visitors so that price differences can be made based on the visitor's country. The system development method used is Rapid Application Development (RAD). The RAD method is used because application development can be done in a relatively fast time. At the system design stage, the Unified Modeling Language (UML) is used as a visual model to facilitate the application development. The final result of this research is an e-marketplace application that specifically sells exhaust products and accessories. The test results were carried out in 6 different locations with details of 4 countries of Indonesia, one country of Malaysia, and one country of Saudi Arabia. Other prices were obtained according to the location of the visitor's country.

Keywords: Application Programming Interface (API), Exhaust, Geographic Segmentation, Geolocation, RAD

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INTRODUCTION

Purbalingga is an area that has a somewhat developed industrial potential, one of which is the exhaust industry. Purbalingga exhaust products have spread throughout Indonesia and even abroad [1]. In 2020 in Purbalingga, there are around 60-100 exhaust entrepreneurs with a total of 4,000 employees [2]. Sales must accompany the number of exhausts produced so the industry can continue running. Marketing strategies and innovations must be planned to increase product attractiveness and achieve sales targets [3]. Market conditions will provide benefits for increasing product sales' productivity conventionally and online; data on Indonesian e-commerce in the second quarter shows that online sales have increased, as seen from three e-marketplaces tokopedia, shopee, and bukalapak[4].

The online marketplace is an activity to provide a place for business activities in the form of an internet shop where traders sell goods or services [5]. An E-marketplace is an inter-organizational information system where sellers and buyers in the market communicate information about products and prices and can complete transactions through electronic channels [6]-[7]. Thanks to the presence of technology in the form of e-marketplaces, trading activities in Indonesia are increasingly increasing, especially in online trading [8]. These technological advances make many companies or service owners develop various sites and even special applications for virtual sales transactions [9].

Although many e-marketplaces have developed, many researchers or companies still create new e-marketplaces according to the needs of their respective products or services with different platforms, among others. Android-based locksmith services marketplace application design [10]. Development of a web-based Indonesian bonsai marketplace system [11]. Development of e-marketplace in-game currency using the Laravel framework [12]. The number of companies still developing e-marketplaces is a consideration for exhaust artisans to participate in developing e-marketplaces with their characteristics that focus on exhaust products.

The e-marketplace built in this study is different from the research conducted by [10]-[11]-[12], which has not implemented geographic segmentation for product prices. In this study, we apply geolocation API (Application Programming Interface) for product price segmentation based on visitor countries. Price segmentation based on the land of visitors is done because the muffler artisans want to adjust the exhaust price according to the price standards in each country. Grouping consumers do geographic market segmentation into market segments according to regional scale or geographical location, where local, regional, national or international market segments can be obtained [13]. Geographic segmentation is one

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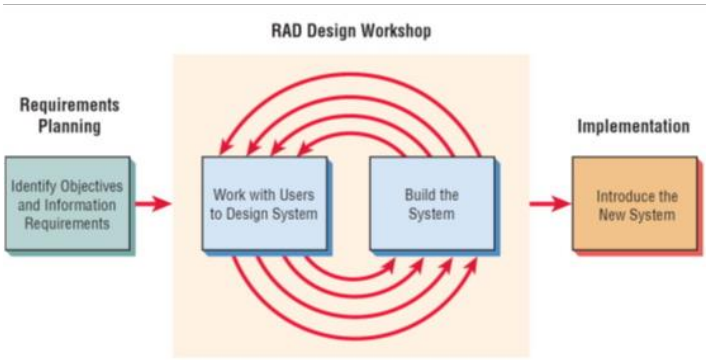
of the variables of consumer market segmentation which consists of geographic, demographic, psychographic, and behavioral segmentation [14]-[15].
Application Programming Interface (API) is documentation consisting of interfaces, functions, classes, structures, and so on to build software [16]. API is an interface technology that can connect one system with other systems [17]. Geolocation is detecting the location of the user's presence using an internet connection [18]. Geolocation identifies the geographic-based location of an object in the real world by getting location coordinates, addresses, and protocol street names [19].

METHODS

The method used in this study is a system development method using a RAD (Rapid Application Development) system development model by applying the Geolocation API for geographic segmentation based on visitor countries. The RAD method was chosen because application development using the RAD method can be done relatively quickly; RAD consists of several stages, namely requirements planning, system design, and implementation [20]-[21]. The stages of development using the RAD method can be seen in Figure 1 [21].



Figrure 1. RAD Stages [21]

A. Requirment Planning

At this stage, identification and data collection are carried out, which will be used in system development. The steps taken were analysis and interviews with three exhaust artisans, which resulted in the needs and description of the system to be built.

B. Design Workshop

At this stage, identification and data collection are carried out, which will be used in system development. The steps taken were analysis and interviews with three exhaust artisans, which, in the needs and description of the system to be built. [22].

C. Implementation

At this stage, geographic segmentation will be implemented using the geolocation API. API acts as an intermediary between different applications on the same platform and on other platforms [23]-[17]. Geolocation API implementation architecture can be seen in Figure 2.

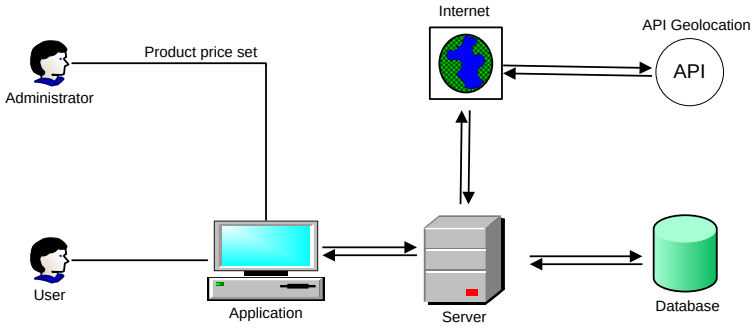


Figure 2. Geolocation API Architecture

Figure 2 is the architecture of the Geolocation API implementation starting from the administrator setting product prices, which are grouped into three segments, the first is the national price for the Indonesian market, the second is the ASEAN market which consists of ASEAN member countries, namely Indonesia,

Brunei Darussalam, Philippines, Malaysia, Singapore. , Thailand, Cambodia, Laos, Vietnam, Myanmar [24], and the three markets other than national and ASEAN. The Geolocation API is used to detect the location of the user's country; the geolocation API used in this research is the API from the geoplugin.net site, which can be used for free.
The geolocation API is implemented on a page that displays product prices to get the country location based on the user's IP. After the country location is detected, the system will automatically show the product price according to the data set by the administrator..

RESULT AND DISCUSSION

This research results from a web-based e-marketplace application that can be accessed at knalpotori.com. The results of this study were produced through several stages, namely requirements planning, workshop design, implementation.

A. Requirement planning

The results of interviews with three muffler artisans produced several needs, including an e-marketplace specifically for exhaust sales and price differences based on visitor geography.

B. Design Workshop

At this stage, a system design will be made, namely use case diagrams, activity diagrams and class diagrams.

1) Use Case Diagram

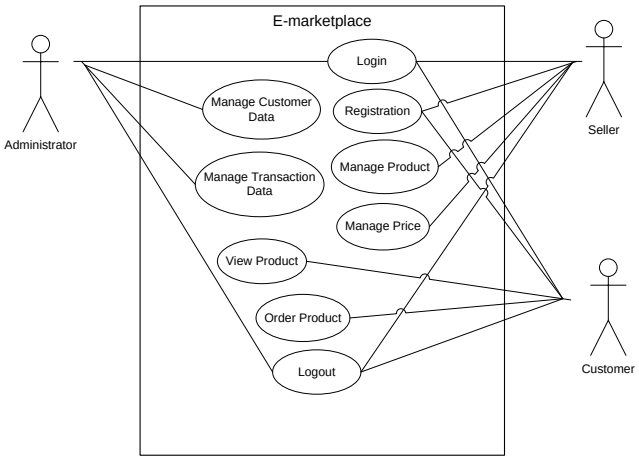


Figure 3. Use Case Diagram

In Figure 3, three actors are involved in the e-marketplace: the administrator, seller, and customer. The administrator is tasked with managing all data in the system and has access rights to log in, manage all seller and customer data, manage all transaction data, view products that have been uploaded, and log out. Sellers are actors who sell products on e-marketplaces. Sellers have access to log in, register, manage products, and manage product prices. The customer is the actor who can see the product being sold, and as a buyer.

2) Activity Diagram

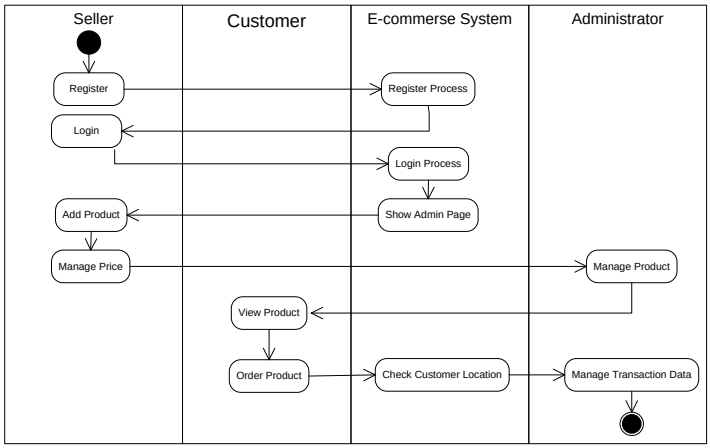


Figure 4. Activity Diagram.

Figure 4 is an activity diagram of the developed e-marketplace. In the activity diagram, sellers and customers who will make buying and selling transactions must register first. Registered sellers can add products and set prices according to the target market. The administrator will manage the product data to determine whether the product is eligible for publication. Customers can view and buy products at the time of placing an order. The system will detect the customer's location to determine the price according to its geographical location.

3) Class Diagram

Figure 5 is a class diagram of the developed e-marketplace.

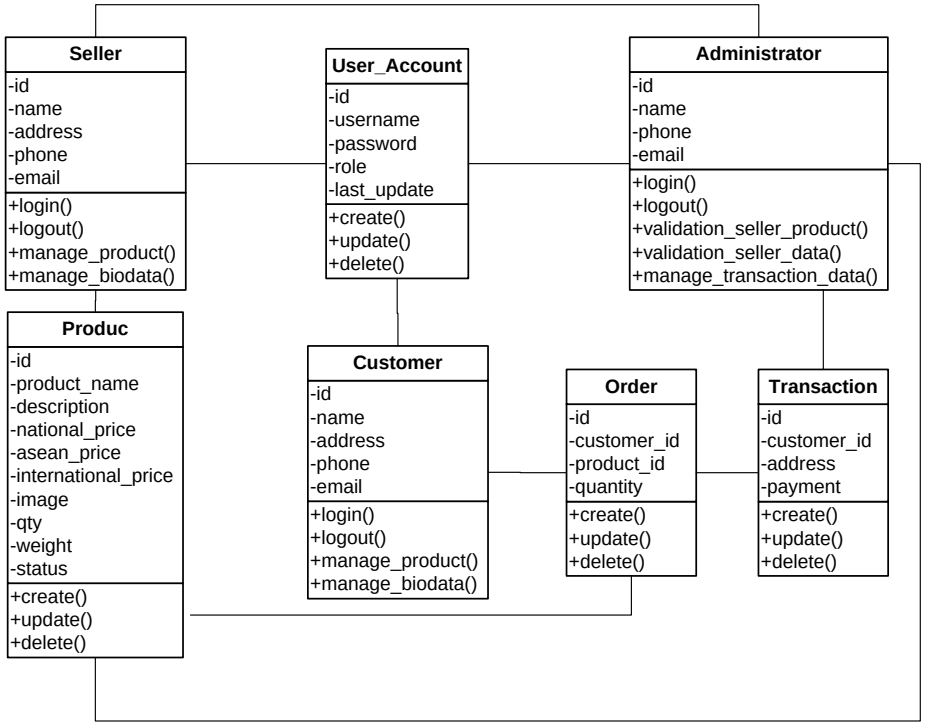
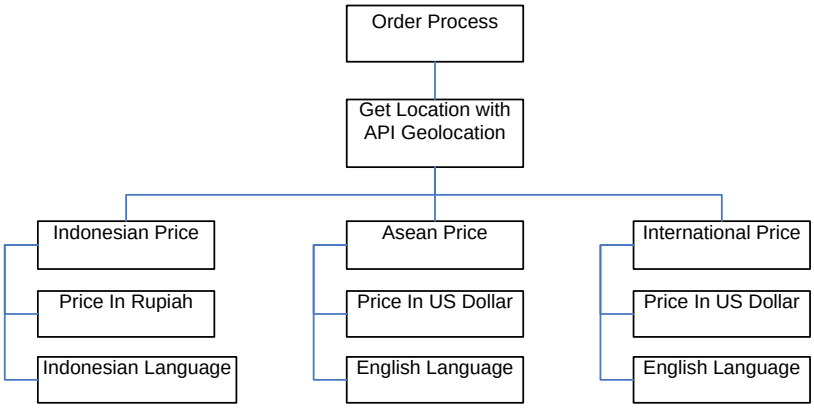


Figure 5. Class Diagram

In the class diagram, there are six tables, namely Seller, which are used to store seller data. User Account, which is used to store e-marketplace accounts. Administrator to store e-marketplace manager data, Product to store product catalog data, Customer to store customer data, Order to keep product order data, and Transaction, which is used to maintain order transaction data from customers.

4) Order Process Flow



Fihure 6. Order Process Flow

Figure 6 is the order process flow. When a customer places an order, the system will detect the location of the device using the geolocation API, then the price will be checked according to the location of the visitor.

C. Implementation

After the requirements planning and design workshop stages are completed, the implementation stage is next. The results of the implementation of the e-marketplace application that has been developed are as follows on Figure 7.

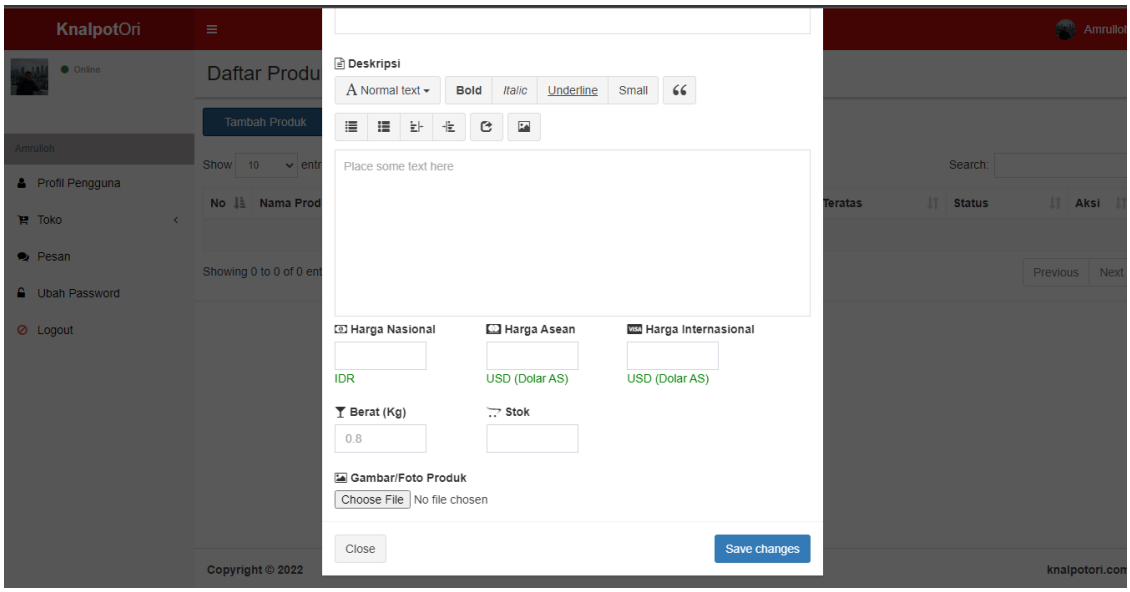


Figure 7. Product pricing page

Figure 7 is a product price setting page used to determine prices based on the location of the visitor's country. There are three price settings, namely national prices, ASEAN prices, and international prices. Registered sellers can access the product price setting page. To access this page, the seller must first log in.

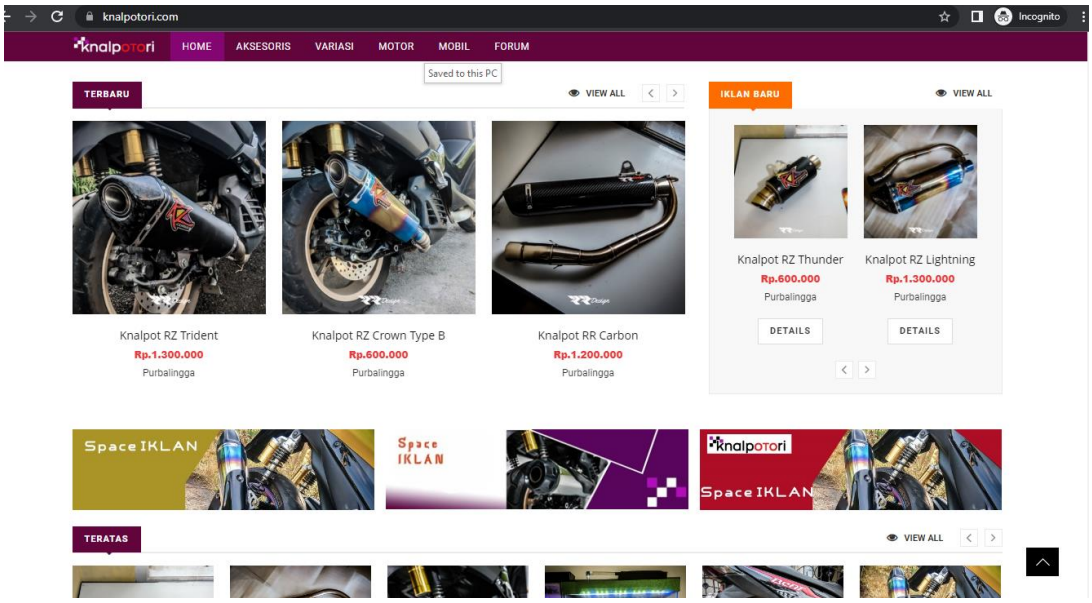


Figure 8. The main page of the e-marketplace

Figure 8 is the application's main page, which will automatically be displayed for the first time when the customer accesses the website. The product price will automatically change according to the location of the visitor's country.

Black-box testing is carried out to test the functionality of the system that has been built. Four users carry black-box testing out to try all the features in the use case in Figure 3. The test results show that 100% of the functions are running well. Then geographic segmentation testing is carried out directly by users in several

different locations, and information collection is carried out in two ways, first to find out the user's location by accessing https://knalpotori.com/search/location, then to find out the price difference based on visitor location by accessing one of the products in the knalpotori.com e-marketplace. From the test results obtained the following information:

Table 1. Test results

Country	Country Code	Contient	Province	City	Latitude	Longitude	Currency code	Price
Indonesia	ID	Asia	Bali	Denpasar	-8.6507	115.2124	IDR	Rp,650.000
Indonesia	ID	Asia	Jakarta	Jakarta	-6.1741	106.8296	IDR	Rp,650.000
Indonesia	ID	Asia	Banten	Tangerang	-6.177	106.6284	IDR	Rp,650.000
Indonesia	ID	Asia	Central Java	Semarang	-6.9932	110.4215	IDR	Rp,650.000
Saudi Arabia	SA	Asia		Riyadh	24.630256	66.743880	SAR	100 USD
Malaysia	MY	Asia		Johor	1.526272	103.667617	MYR	80 USD

The test results in table 1 were carried out at six different locations consisting of 4 Indonesian countries, 1 Malaysian country, and 1 Saudi Arabian country, and the result was that price segmentation based on the country of the visitor was successfully implemented with a difference in the price of Indonesia IDR 650,000, Malaysia 80 USD, Saudi Arabia 100 USD.

CONCLUSION

The application of geolocation API can be used to detect visitor locations, and geolocation can be applied to web-based and mobile applications. In this study, the geolocation API can be used as a solution to differentiate product prices based on the visitor's country according to the wishes of the seller. The drawback of this research is that the application uses an API provided by another source, so it has a dependency on the service provider.

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