

Development of The Open Mobile E-commerce Platform Using 3D GIS and E-catalog

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Abstract Recently, E-Commerce demands an integrated solution for online and off-line provided to customers on wired / wireless network and various mobile devices. Our E-commerce platform can use anytime, anywhere, for all consumers. And, it can take convenient and secure E-commerce service in mobile environment. So, we will implement a software platform base on the mobile environment that independent of the mobile OS. Particularly, our E-commerce platform is based on 3D GIS information for 3D electronic map. So, all users (customers) have got the more visible convenience. And, by using the e-catalog DB cloud server, off-line store operators can be built the online home-page easily. From now on our E-commerce platform based on 3D GIS can be usable at various E-commerce areas in the ubiquitous environment.

Key Words : E-Commerce, LBS, 3D, GIS, E-Catalog

1. Introduction

A lot of E-Commerce (Electronic Commerce) services are currently used in web and mobile environments [1][2][3]. Among them, E-Commerce services in mobile environment have become the greatest issue with enlarging market. Web environment in general refers to services provided on PC, and such services significantly limit the movement of users. However, while there is no limitation of the movement in mobile environment, expression of contents is limited in comparison to PC. Table environment has newly appeared to resolve limitations of both, but services are still only provided online.

Within such reality, users want to instantly

purchase wanted products with convenience like online market. Also, they want to buy a product that checks the one for purchasing like off-line market. So, an advanced mobile platform that possesses advantages of both online and off-line E-Commerce services is necessary.

The aim of this paper is to implement an advanced M-Commerce service that confirms user location on 3D GIS (Geographic Information System) information and finds online sites and off-line stores nearby user location. The format of this paper is as follows. Technological trend of L/M-Commerce (Location/Mobile Commerce) is briefly examined in Chapter 2, and Chapter 3 explains M-Commerce system based on 3D LBS (Location Based Service). Implementation of our system is shown in Chapter 4, and Chapter 5 concludes with future research tasks based on this paper.

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2. Related Works

2.1 M-Commerce

M-Commerce generally refers to E-Commerce in mobile environment centered on wireless network. It is basically similar to E-Commerce, but mobile communication terminals are used in mobile environment. It differs from E-Commerce in terms of contents, applications, and business models like profit opportunity. While existing E-Commerce was based on wired network connected from specific places using immobile terminals, M-Commerce that makes use of wireless network with mobile communication terminals is currently leading the industry.

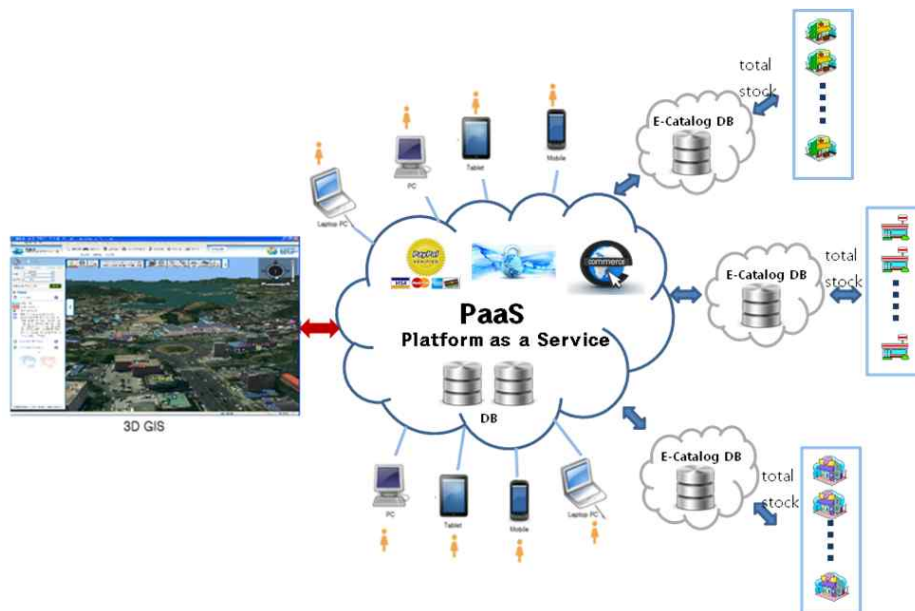
2.2 L-Commerce

LBS refers to services that provide location based information by connecting to the base station of mobile terminal or GPS (Global Positioning System)[4][5]. L-Commerce can be described as a

field that commercially connects LBS with E-Commerce. It is not yet actively used in the market, but the concept of L-Commerce that goes beyond M-Commerce will be expanded and introduced.

2.3 3D Electronic Map

3D GIS technology is rapidly spreading to diverse fields with development of mobile devices with internalized LBS (Location Based Service) function. Such concept of GIS is evolving into an integrated information system that comprehensively accommodates for application of gradually increasing user classes, rather than an expert information system used for special purpose of analyzing and managing limited information using single software. Furthermore, it is becoming available in diverse information handling platforms and environments along with development of IT. Also with popularization of various mobile devices such as smart phones, tablets, and exclusive embedded devices, the value of LBS technology is greatly



<Fig. 1> The system structure of the proposed solution

increasing.

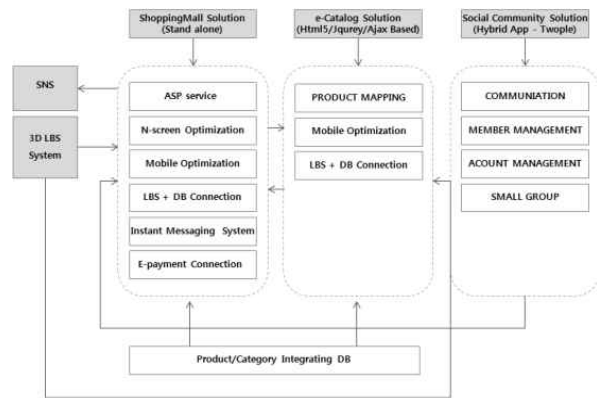
3. System Configuration

The purpose of this system is to develop a smart convergence system that provides convenient distribution services to consumers anywhere and at any time in online and off-line mobile E-Commerce markets. Figure 1 is the overall system structure of our solution.

Our system is composed the 3D GIS, PaaS (platform as a Service), E-catalog DB and Offline stores. PaaS is a service that it is a formal online market solution. PaaS has a item DB, customer DB, UI and payment system. As shown in Figure 1, offline store should be changed online store. That is to be implementation of the online store solution used the electronic catalog and the electronic catalog cloud DB server. When it is using electronic catalog, each individual Off-line store does not need to implement it's own designed shopping mall. Also, when it is using the electronic catalog cloud DB server, by sharing the same items in the cloud DB, it is increasing the efficiency to be make web design. Users can search wanted products on various devices including PC and mobile. Products in nearby off-line stores can also be searched using 3D GIS. Route information to off-line stores is provided, and shortest distance can be calculated as well. Figure 2 represents configuration and relationship of each system function

Detailed functions of this system can be seen in Figure 2.

As shown in Figure 2, our solution composed three parts. Shopping mall solution is a overall PaaS. Also, it has a e-catalog solution part, optional community solution (social community service). Our solution's major characteristics are Allows direct E-Commerce in electronic catalog using an electronic catalog solution with off-line store DB. And, It is to Allow the examination of user



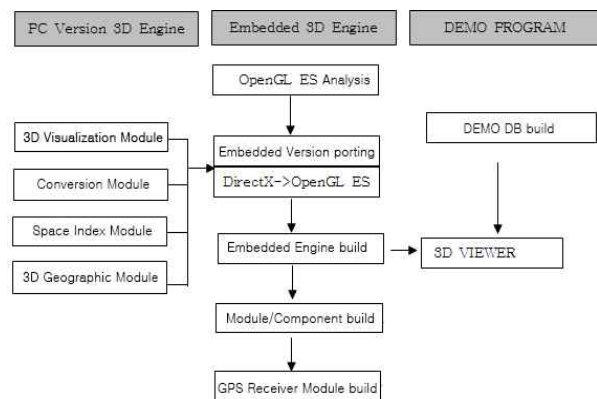
<Fig. 2> The block diagram for each function

preference on products using external SNS[5][6][7]. Finally, our solution is to provide a route guide to off-line stores using 3D LBS system.

4. System Implementation

4.1 3D GIS for Mobile

To implement 3D map for mobile, 2D map data for PC is first converted to 3D. Also, 3D engine for PC is converted into mobile version. Figure 3 illustrates the development process of 3D engine for mobile.



<Fig. 3> The mobile 3D engine development process

Figure 4 is the embedded version of OpenGL-

based 3D map made according to the process above. Screen on the right shows route search with spatial search module [5][6].

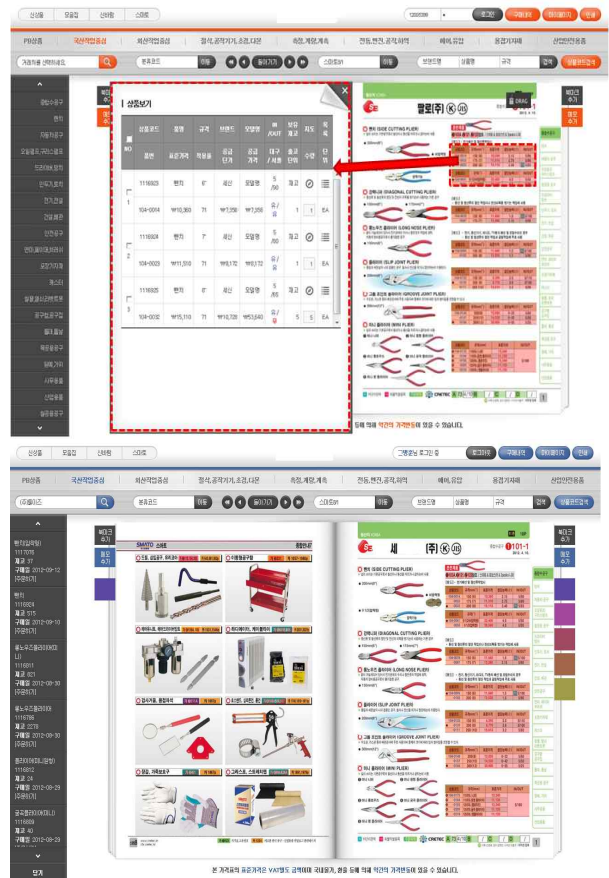


<Fig. 4> The mobile 3D map and route search result in a smart phone

4.2 Connection of Electronic Catalog and E-Commerce

The E-Commerce solution based on Electronic catalog was involved as a means to construct an E-Commerce system for online and off-line stores without limitation of device. System functions related to E-Commerce such as product ordering were included, and electronic catalog data were stored on cloud server DB. Thus, client shopping mall can easily be launched at any time using the shared electronic catalog. Such electronic catalog system was developed in hybrid web app method and can provide optimal UX (User Experience) on any device. Figure 5 is an E-Commerce solution based on electronic catalog.

As in Figure 5, when a product is selected on the right side of the electronic catalog, product name, spec and inventory status are displayed on the left side. When map item is selected, location of off-line store can be searched. Figure 6 shows a page that integrates 3D electronic map with E-Commerce solution based on electronic catalog.



<Fig. 5> The E-commerce solution based on electronic catalog

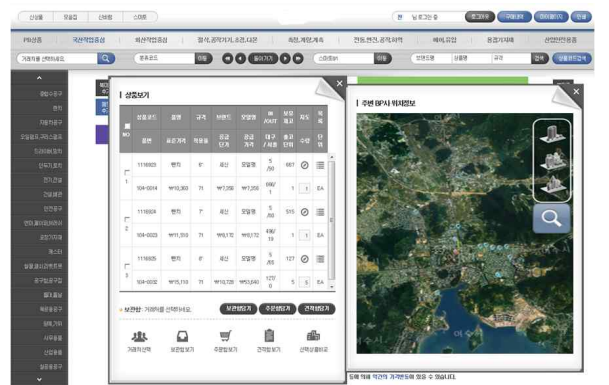


Fig. 6. The Integrated solution result

Figure 7 shows the use of this system on different type devices. User convenience was maximized by providing optimum size and UI/UX for each devices.



<Fig. 7> The application result by each device

4.3 Discussion of Results

This system has advantages of convenience in purchase and selection of reliable store by E-Commerce users as it includes online / off-line stores. Moreover, it can offer an infrastructure for off-line retail stores to construct E-Commerce systems at lower cost and in shorter time. Also, lower cost is required in comparison to E-Commerce solutions in general. Figure 8 shows the cost required for manufacturing general solutions and the proposed solution. general solution is a common existing online shopping mall solution.

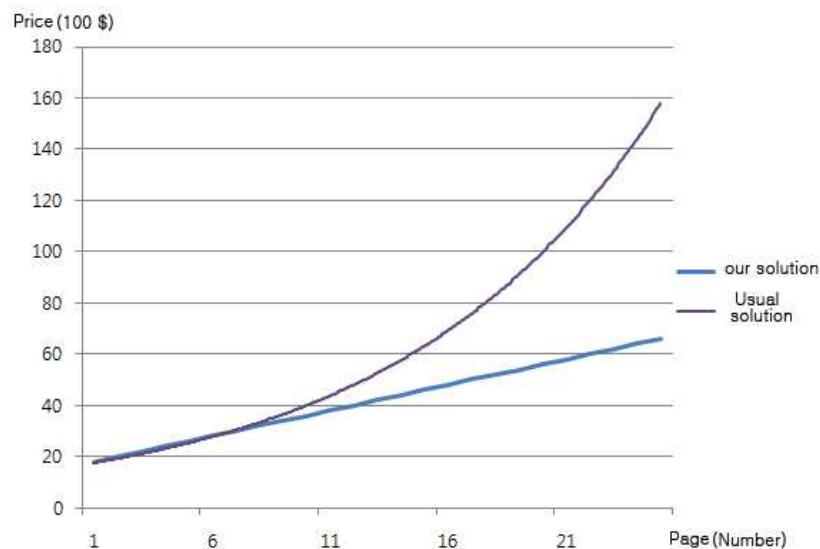
It's mean that each individual operator must to

be make a separate online shopping mall.

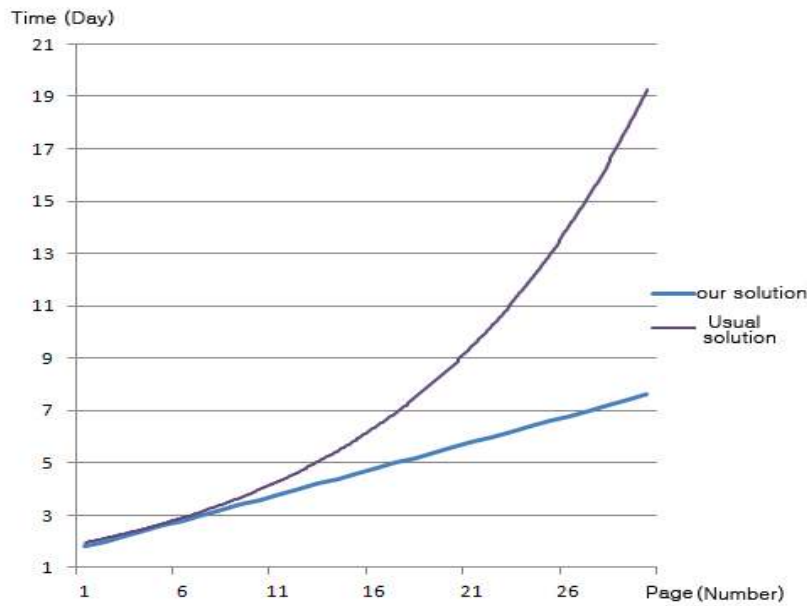
That solutions are consisted of item's introduction and page's design into each page. So that's solution is required production cost per each page. Our solution can construct E-Commerce page for off-line stores in short time. As product DB is shared on the cloud server, solution can be prepared simply by selecting products sold by each store and examining inventory stock of the selected products. Figure 9 shows the time required for general solutions and the proposed solution.

5. Conclusions

Recently, E-Commerce demands an integrated solution for online and off-line provided to customers on wired/wireless internet and various mobile devices. Connection with GIS information is deemed essential for integration of online and off-line stores in E-Commerce, and the use of 3D electronic maps is being generalized for convenience of user recognition. In this paper, an advanced M-Commerce service solution was implemented to confirm user location using 3D GIS information and



<Fig. 8> The price per page for each solution



<Fig. 9> The time required for each solution

to find online stores and off-line stores nearby user location. This solution offers various conveniences in establishing E-Commerce system for off-line stores, along with convenience for consumers. E-Commerce can be applied to more diverse products and more applied solutions can be developed using the proposed solution. Future research task is to create this solution in HTML 5 environment.

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