

Design and Implementation of Fire Management Components

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Abstract: In Korea, fire is the second frequent disaster. A total of 32,966 fires were happened in 2002, and injured 2,235 people and damaged 12 million dollars. So, we developed several components related to fire in order to decrease these victims and the amount of damage and have applied those components to Daegu Fire Agency. In this paper, we describe the developing system. It consists of 5 major components: mobile fire facility management component, web service component, fire management component, fire server, and fire application. They were developed in object-oriented computing environment, ATL/COM and Visual C++. So, they have some advantages such as high reusability, full interoperability, and easy understanding.

Keywords: Fire Management, Component

1. Introduction

Korean Government separates disasters into two groups. One is natural disaster such as typhoon, flood, heavy rain, storm, storm wave, and etc. The other is artificial disaster such as fire, ocean accident, explosions, traffic accident, environmental pollution, collapse, ferry or pleasure boat upset and etc. Traffic accident has been ranked at the top in occurrence frequency and fire does at the second. According to an annual report of disaster, a

total of 269,704 disasters were happened in 2002, 230,953 traffic accidents of them were occurred, and 32,966 fires were produced and resulted in total costs of about 12 million dollars[1].

Koreans should recognize the types of disasters they may face. There are a significant number of natural or human made disasters, from floods to chemical fires, which could occur in this country. To the extent practical, Koreans should be reasonably prepared for them.

Korea has a highly-developed response capacity, and a great deal of proven experience for dealing with all types of disasters.

Korean Government has E119 system like E911 of U.S.A. Also, Korean Government will launch National Fire and Disaster Prevention Agency in this year. This organization has an ability and facility to prevent and deal with effectively various disasters.

We developed fire manage components according to the requests of fire agency to improve the ability of fire extinguishment in 2002. And this year, we are cooperating with Daegu Fire Agency and we are applying our components in order to build fire management system operating on there. Our developing system consists of 5 components such as mobile fire facility management component, web service component, fire management component, fire server, and fire application. The most important function of the

system is the confirmation of the 119 caller's location by using GIS capability. And the second feature is the capability of accessing diverse GIS data sources. Fire Department requests us to access different data stores that were located in several organizations. The third one is mobile editing system.

Our main idea to develop these components is to apply them for every disaster management systems. So, each component could be reused in other disaster management system after changing some parts such as business logic and GUI. Also these components are based on MapBase technology that we developed from 1999 to 2001.

Figure 1 shows you overall system configuration.

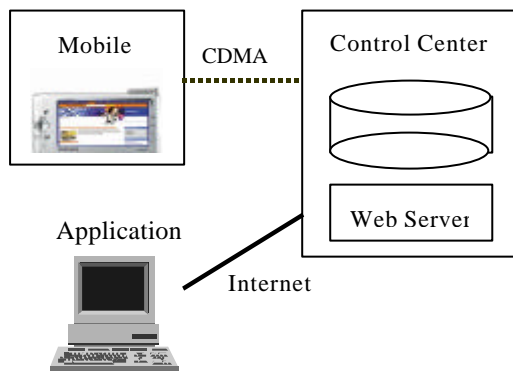


Figure 1. System Configuration

2. Fire Management System

Our developing fire management system consists of 5 components such as mobile fire facility management component, web service component, fire management component, fire server, and fire application.

2.1 Mobile Fire Facility Management Component

This component was operating on PDA. A fire fighter carries out the PDA ported this component and checks several fire facilities in his working area. The input data will be transmitted to data server of the control center in the base of Daegu Fire Agency or of the fire station he is working. The member of Daegu Fire Agency urged this component to decrease the amount of their business because they checked fire facilities and wrote the locations and conditions of them in paper and entered them into the server in fire station after they returned. To implement this component, we designed a mobile data format suitable mobile device like PDA(Personal

Data Assistance) and implement data converter to transform an original data into PDA data. Also, we are developing several functionalities such as editing, drawing, searching, managing layers, and GUI on PDA.

Figure 2 shows you an example of this component on PDA.

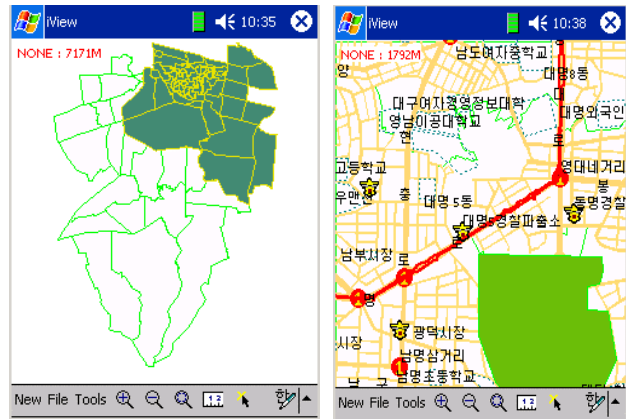


Figure 2. An Example of Screen Control

2.2 Fire Management Component

Fire Management Component, FireCom, consists of two kinds of components: Controller and DataProcedure.

Controller manages map layers in database and on screen, and contains editing for spatial objects and searching for spatial and attribute data by using SQL. And it contains fire business logic.

DataProcedure conforms the standard of OGC's Simple Feature Geometry Specification[2]. It can connect data stores through Internet and access spatial and attribute data on them.

Daegu Fire Agency requested us to access different data stores that were located in several organizations, which are located in the same area with it, such as Korea Telecommunication, DAEHAN Oil Pipeline Corporation, Korea District Heating Corporation, Korea Electric Power Corporation, Korea Gas Corporation. These heterogeneous connections are indispensable to increase the capability of the prevention and extinguishment of fire. DataProcedure supports this functionality.

2.3 Fire Server Component

When several members in control center access Fire Server Component, FireServer, at the same time, it should provide constant response time to them. So, FireServer adopted distributed processing technology.

Also, FireServer manages all client information and defines a protocol to provide some information to WebServer.

2.4 Web Service Component

Daegu Fire Agency is using paper report involving fire extinguishment condition or statistics. So, it wants to develop web service to provide them to senior official and public. However, we will offer some information through web service in inner-organization because the security is not resolved. After solving that problem, we will extend the service to public.

Web Service Component consists FireWebServer and FireWeb.

FireWebServer supports multi-user accessing and managing them and gets some information from FireServer.

FireWeb is a component to control map on Web browser. This provides map control, address searching, fire facility searching, general facility searching, location searching of a disaster or a reporter, and fire engine moving status.

Figure 3 shows you an example of this component.

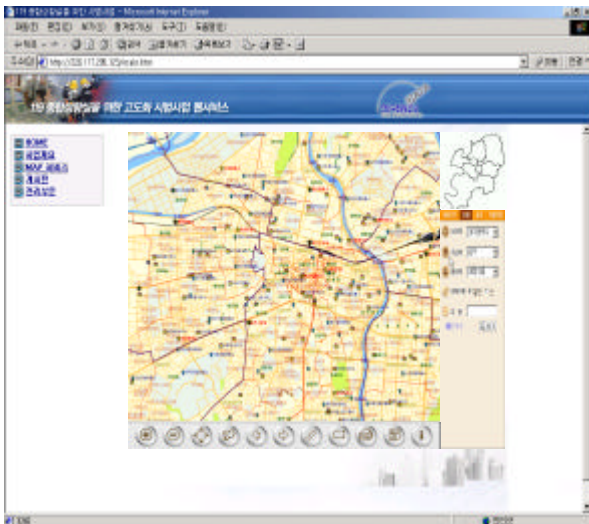


Figure 3. An Example of Web Service

2.5 Fire Application

Fire Application, SafetyGIS, is based on FireCom. SafetyGIS can control the fire and analysis, search, and edit the data of the firing area. It supports map layer control, fire facility management, annotation display, spatial or attribute searching, and etc. All users interact

with this component.

Figure 4 shows you an example of this component.

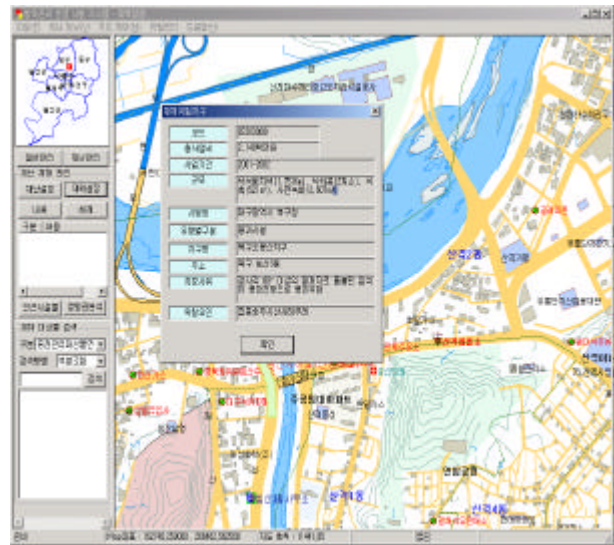


Figure 4. An Example of Application

3. Conclusion

The ultimate objective of the GIS-based fire management system is to provide quality service to the public and to minimize the harmful effects of fire as well as minimize the loss of human life and property as a result of fire.

The fire management system and 5 components to build it described here are based on MapBase technology. This system will be typically used by Daegu Fire Agency from next year. The system will undergo extensive testing to identify disadvantages which improvements or enhancements are needed. In addition, it must be determined if certain aspects of the system will be effective under field conditions.

References

- [1] Ministry of Government Administration and Home Affairs, 2003., An Annual Report of Disasters in 2002
- [2] Open GIS Consortium, Inc., 1999, OpenGIS Simple Features Specification for OLE/COM Revision 1.1