Implementation of Port Logistics Information System using e-Government Standard Framework

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Abstract

Country according to the rapid development of IT technology with the introduction of e-government information systems are managed efficiently. However, using the framework of different specifications of e-government system has been developed. The development of these methods, such as redundancy and interoperability problems occurred. In this paper, we utilizing e-government standard framework for the port logistics information systems proposes to design and implement. Based on a standard framework by implementing information systems to reduce human and material resources, and ease of writing source code, avoid duplication, reuse, and interoperability is guaranteed.

Keywords: E-government, Standard Framework, Port Logistics Information System

1. Introduction

Recently, countries are trying to structure e-government information system to improve public services and administration efficiencies with rapid development of IT technology [1]. Now all ministries have a duplicated development of systems and interoperability problems, because they have developed and managed their own information system for their needs and policy. To solve this problem, it is discussed to structure the systems based on standard framework. E-government standard framework, a standard form of developing framework to apply in public works, improve to standardize application software, quality and reuse [2].

In this study, we structure the port logistics information system with e-government information system model using standard framework based on web government promotes. We suggest a solution to structure e-government port logistics information system that can respond the interoperability problem efficiently and reduce the running coast. For this, we analyzed the concept of e-government standard framework, the combining effect and the examples info-system based on standard framework was structured. To design the port-logistics info-system based on e-government info-system, we suggested the planning solutions for system of executing, managing and developing environment and common component.

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2. E-government Standard Framework

2.1. E-government Standard Framework

Standard framework designs the code in advance that standardizes necessity functions to develop information systems and the developers add and assemble the functions. So standard framework completes the whole system efficiently.

In this way, e-government services with improving qualities and low-cost can develop the national info-systems. This can allow fair competition between small and big companies. Before developed with standard framework, the info-systems were developed similar functions in every e-government information business and depended on previous business as a technology subordination. Developers which don’t have any framework have had problems that much money were spent for maintenance and human and material resources were used too much when they had a disadvantage in competition or connected with info-systems. Therefore, it is more required to develop information systems using standard framework in order to respond environmental change, customers’ various needs, new business modes, global integration, etc.

![Figure 1. The Concept of E-Government Standard Framework](image)

Figure 1 is the concept of e-government standard framework. Developing information systems with standard framework reduce a cost and solve the subordination of previous business because of reusing common component [3].

2.2. The Components of E-government Standard Framework

E-government standard framework is made up the application architecture needed to information systems based on web and standard framework offering the basic functions and the common component. Standard framework is made up of these things; executing environment, developing environment, operating environment, managing environment and common component. Table 1 describes the component’s functions and roles of e-government standard framework.
Table 1. Standard Framework Functions and Roles of the Components

<table>
<thead>
<tr>
<th>components</th>
<th>functions and roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>executing environment</td>
<td>- The common components to execute a program developed in the e-government business.</td>
</tr>
<tr>
<td></td>
<td>- The environment of an application program to support standardizing for screen of</td>
</tr>
<tr>
<td></td>
<td>developing programs, server programs and developing data.</td>
</tr>
<tr>
<td>developing environment</td>
<td>- Providing environment to develop e-government programs</td>
</tr>
<tr>
<td></td>
<td>- Tools of developing screen, Tools of developing components, Tools of developing data</td>
</tr>
<tr>
<td>operating environment</td>
<td>- Providing environment to operate a service operated on the executing environment.</td>
</tr>
<tr>
<td></td>
<td>- Monitoring, Release, Managing system, etc.</td>
</tr>
<tr>
<td>managing environment</td>
<td>- The module for managing and distributing developing framework and common service to</td>
</tr>
<tr>
<td></td>
<td>each developing project</td>
</tr>
<tr>
<td>common component</td>
<td>- A set for developed applications to be able to reuse to use in common when an</td>
</tr>
<tr>
<td></td>
<td>application SW is developed in the e-government business.</td>
</tr>
</tbody>
</table>

2.3. The Examples of Applying E-Government Standard Framework

In Korea, after the standard framework portal system was opened in June, 2009, it is adapted to 219 public and private Information businesses until April, 2012. It set the record of about 171,000 downloads in the shortest time among Korea free software. Total 2,792 people learned standard framework and it is spread more widely than expected. Table 2 is standard framework portal system operating status.

Table 2. Standard Framework Portal System Operating Status

<table>
<thead>
<tr>
<th>sort</th>
<th>statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Framework Downloads</td>
<td>98,944</td>
</tr>
<tr>
<td>Common Component Downloads</td>
<td>72,375</td>
</tr>
<tr>
<td>On-line Technical Support</td>
<td>3,008</td>
</tr>
<tr>
<td>Total Visitors</td>
<td>138,097</td>
</tr>
</tbody>
</table>

E-government services of EU announced framework to guarantee interoperability among countries and recommend to make GIF (Government Interoperability Framework)[5]. England established a task force to secure e-government system interoperability and the ministries and e-government force e-GIF as a framework.

U.S arranges the organizations’ task and IT from a standardization standpoint that uses interoperability as a core and systematizes to raise the organizations’ results [6].

The Australian Government Interoperability Framework (AGIF) allows the interoperability not to restrict only the information flows between information systems and organizations in order to structure service messaging systems that is valuable as main factors of e-government strategy execution.

It also consider that the interoperability is the common Mind-set including understanding of organizations which improve business process effectively over the area of each organization [7].

3. Designing Port Logistics Information System based on Standard Framework

We suggest the solution that port logistics information system made on this study is designed and structured with less human and material resources than existing information system by using standard framework of e-government. Users can check various information’s such as vessel info, a
status of vessel permits, loading, unloading, information of shipping flows and Integrated logistics report.

Figure 2. Port Logistics Information System Overview

Figure 2 shows port logistics information system overview based on e-government standard framework. In order to structure this, we use developing environment, operating environment, managing environment and executing environment. Developing environment of e-government standard framework means developing tools for using various functions effectively provided to develop more accurate and effective applications in the executing environment.

Developing environment of e-government standard framework consists of 4 service tools; Design, Test, Build, feature managing. This study use Eclipse for Java Editor as a design tool, JUnit that support to make Testcase and use Testcase for monitor through Testcase Generate as a test tools and dependence setting and managing libraries of Maven as a build tool [8].

Operating environment provides functions for operating framework of system applying standard framework. Agent is executed in the system of monitoring target based on setting that is schedule, logging, etc., when executed, agent records and gathers the system info and the program log. It structures environment that shows operator gathered info with graphs and charts. Managing environment provides functions for managing framework that is the using status tools to understand operating status of framework and improving functions and maintenance of framework. The system consists of functions to manage common component and standard framework on managing environment.

It provides functions of managing feature and change such as develop source, released file and production. It also provides functions that receive, process the requiring for services and resources from organizations using framework and feed back the result. It provides functions to manage framework standard such as version upgrading, replacing upgraded version, adding new functions, etc.

Executing environment of e-government standard framework consists of 5 service groups and provides 34 services. In this study, we use 7 services. The system defines data type used on task layer to prevent task logic layer changing and provides in/out parameter changed properly on screen layer. It supports a business logic and separation of task flow on the process control layer and provides the functions executing processes defined in advance.
Figure 3. Port Logistics Software Configuration

Figure 3 is a software configuration. J2EE, JAVA, Database Server are installed to the hardware in Server Side of Port Logistics Information System. There are the security e-government information system define. Including Framework Utility, Spring and Framework Core Component. In the Framework utility, there are Date Utility to handle the date data, String Utility for string data, Configuration Utility for basic setting data, Database Utility for data server and Reflection Utility to declare. In the spring, there are Business, DataAccess and Common Component. In the Framework Core Component, there are EJB, Service Delegate, Service Locator, etc.

Figure 4. Standard Framework Configuration

Figure 4 is standard framework configuration, shows a flow of e-government standard framework. When it is handled through Dispatcher, in the controller, it uses JUnit and Java and pass into IoC Container that is basic function of framework. Then, it uses Business Layer Component of framework and DAO Component of Persistence Layer and passes through Integration Layer. Users are received the result as JSP forms using View.
The Relationship between the Design Model Configuration Package

Figure 5 shows the relationship between the design model configuration package. It is used User Case Diagram and expressed for clearing external process interacted between layers. When it enters through the filter from Presentation Layer, Dispatcher allocates it to Pre-Handler, Controller, Post-Handler and View. Then, Controller sends Service Delegate it through Service Proxy and Delegate sends Invoke and Model, it View sends Model, it using JSP, which plays the role of the messenger between Layers. Invoke in Business Layer is inherited to Service and in ServiceImpl is referred to EgoveInteractionService, the e-government standard framework of Model and Integration Layer, and DAO the Persistence Layer. As DAO is inherited to Model, it is referred to SqlMapClientDaoSupport through the abstraction DAO. Figure 6, the sequence diagram, shows the messages that objects exchange with objects participated in by the lifelines and time order.


The main system designed in this study uses eGovframework of e-government standard framework and Tomvat 6. The database uses the database of the integrated logistics information. So, Port Logistics Info System based on e-government standard framework is designed.
Figure 8 and 9 are the ships entering and sailing report screen. You can check the entering report and sailing report that are declared in the Maritime and Port Authority during the time a ships designates.

Figure 9 and 10, the freight transport Performance screen, are designed to be able to check the performances of main ports by annual and commodity.

Figure 11, the Shipping schedule information, is made to be able to check the numbers of
voyage of the terminal, estimated time of departure, the numbers of voyage of the ship companies, the call sign, vessel name, unloading, loading, transfer and declaration of the amount of bulk. When the page can’t show once because of much ships, the page number will be showed.

Figure 12, the Berth assignment status, shows the list of ships expected entering the terminal. It is made to be able to check the numbers of voyage of the vessel, vessel name, estimated time of departure, estimated time of arrival, amount of estimated loading, unloading and transfer, ship companies and the berth of port. Lastly, PKI is applied to improve the system security and the system is designed as a solution to minimize the conjunction of systems by debugging using tools of static source analysis.

5. Results

This study proposed the solution to design Port Logistics Info System using e-government standard framework. It reduced human and material resources by designing Port Logistics Info System using e-government standard framework and can maintain the convenience of the making source codes, avoiding duplication, reuse and compatibility of frameworks and consistency of the development ways.

In the developing web applications based on e-government standard framework, the challenges are that persistent improving and sophisticating of software’s are more advanced than early technology developing.

The next challenges are that e-government standard framework will spread into public and private quickly and it is expected to apply standard framework to most business of structuring public info-system but the reality is the lack of expert developers compared to spreading speed.

It has to be continued to study of quality evaluation model specialized for web applications based on standard framework. So, it is needed setting a base to provide web applications that has better quality.

References

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