Service-Oriented Data Sharing Software Framework for Flood Prevention Information System

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Abstract: China is a flood disaster-prone country, flood prevention departments in different regions need different levels of information. However, flood prevention and various types of data involved in distributed systems in different applications, share level is not high, and the data more than a subsidiary of a business database, the low level of standardization and data sharing, results reusability is not high, therefore, flood prevention and information sharing Construction of the platform has immediate practical significance. In the analysis of flood prevention and information sharing based on the current situation and problems, this paper introduces the thinking of building a service-oriented architecture, discusses the implementation of flood prevention objectives of information sharing services, technology systems and building contents, put forward a more comprehensive and standardized service-oriented architecture information sharing technology framework for flood prevention, flood prevention and spatial data to achieve the data sharing technology and business model for local conditions to carry out flood prevention and information sharing at all levels, building a technical reference.

Keywords: Flood prevention system, GIS, SOA, Sharing service platform

1 Introduction

Flood prevention work is the people's livelihood systems engineering, to establish a reliable flood protection software system for flood prevention work to make precise analysis, rapid decision-making, are extremely important. At present, flood prevention departments at all levels of flood prevention needs of diverse information. Therefore, various types of flood prevention information system to maximize sharing and integration, without duplication, and conserve resources while reducing investment premise, ordered a reasonable construction, thus sharing information systems at all levels, is put in front of builders and decision-makers at all levels with a serious issue. Flood of information applications and services with a cross-regional, multi-disciplinary, real-time updates and other features, the face of various flood prevention services, we mustmobilize distributed in different regions, different professions, different units based on the available data. Therefore, the need for new information technology to achieve real-time network environment to enhance the application of interoperable services. How to improve flood management and sharing of information, and provide a basis for flood prevention and emergency protection, is China's flood prevention information in the process of building one of the most basic and critical issues. Against this background, construction of flood prevention system in deyang city, Sichuan province, for example, proposed flood information service framework for building service-oriented architecture, with urgent relevance.

2 Service-oriented Analysis of Flood Information Sharing

Currently, business-oriented architecture framework for flood prevention systems (see Figure 1) to meet the basic business of Deyang city flood data, spatial data, based on application requirements, the development of several software modules, to a certain stage of time to meet demand for flood prevention authorities, This architecture components of all business functions running on the client or the Web server side. The main advantage of business-oriented architecture is that developers can just focus on a business, development of simple, fast formation of an independent applications. However, this architecture is the "closed" architecture, heterogeneous, cross-platform, cross-departmental data
exchange powerless. Departments at all levels of business and data have different requirements, particularly the sharing of spatial data requirements is particularly prominent. Meanwhile, the existence of various departments at all levels, "heterogeneous" system, with a comparison sample table, for example, from A (city), B (city), C (county) application system components for flood prevention department The comparative table (Table 1) shows that "heterogeneous" phenomenon exists.

![Figure 1 Business-oriented structure of Deyang flood prevention system](image)

Table 1  Flood prevention system user heterogeneous environment

<table>
<thead>
<tr>
<th>Type</th>
<th>City A</th>
<th>City B</th>
<th>County C</th>
</tr>
</thead>
<tbody>
<tr>
<td>DataBase</td>
<td>Oracle</td>
<td>SQL Server</td>
<td>None</td>
</tr>
<tr>
<td>GIS Platform</td>
<td>ArcGIS</td>
<td>SuperMap</td>
<td>MapInfo</td>
</tr>
<tr>
<td>Data Format</td>
<td>Mxd, Shp</td>
<td>SMW, SDB, SDD</td>
<td>tab, mif</td>
</tr>
<tr>
<td>Application directions</td>
<td>Flood prevention and scheduling, data collection</td>
<td>Rain and water monitoring</td>
<td>Rain and water monitoring</td>
</tr>
<tr>
<td>Building model</td>
<td>Separate establishment</td>
<td>Separate establishment</td>
<td>Separate establishment</td>
</tr>
<tr>
<td>Sharing mode</td>
<td>National forecasting of rain and water network</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

3  SOA Service Framework For Flood Prevention

3.1 Service-oriented application integration framework for flood prevention

Most software systems were originally designed for flood prevention limited to requirements, operational within the system is complete, the data is valid, but the studies did not provide access to the interface. To make these flood prevention system interaction, it is necessary to store their data and feature packed up for outside use. This design of flood prevention and application integration framework pattern based on a service-oriented architecture (see Figure 2), and existing flood data through Web services and applications for flood prevention associates, reuse existing flood data and related services, flood prevention and data analysis of the results to the client in the database, tables, graphics, images, forms of Visual expression. Based on service-oriented architecture to build loosely coupled application integration can be achieved through the application of integrated flood prevention and data sharing. Web-based service for both structured and unstructured data management for flood prevention. Data is stored in the form of content management, and unified publishing through Web services, integration of business data and spatial data storage. Users contact each other through a common interface for flood prevention, on the basis of mutual understanding necessary to transparently access on flood prevention.
and spatial information. All flood-related components are deployed within the SOA Web Services server, WebGIS components relating to the space operations: ArcServer ADF, ArcServer FlexAPI, ArcServer Silverlight API etc, are deployed in ArcGIS Server on the web server.

Web Service that encapsulates the business functions and processes, and only released the provider, for all types of “heterogeneous” customers to provide a unified call entrance, implements the type, location, and the client is not dependency, realization of flood prevention and data integration. Implementation of business processes including flood data query, analysis, summary, statistics, as well as flood prevention and interoperability of spatial data, attribute data, received from the client proxy classes from the client request, called business process layer components are processed and returned to the client proxy class instances. Spatial data server, or an attribute, document services, grid services are deployed on the corresponding server, thus hiding the details of server clusters and distribution.

3.2 SOA combination of flood prevention system

Flood prevention system design based on service-oriented architecture, you must follow the principle of component reuse. Compatibility with these components the best language for Web service wrapper, write specifications based on XML interface and unified register of access to a centralized Web Service Manager to set up logically, physically integrated autonomous computational information resource centre. Background Web components can be deployed on the server in the IIS ASP.NET Web services can also be deployed in other application servers.

For example, a user commit a “flood prevention and thematic information request”, the client sends a message to an SOA server, the server is called business process execution of pre-designed discovery process nodes, order calls the appropriate measuring station information queries, queries, and reservoir storage, digital plans for a query component. These components reside in the Web service as a service on the server, from distributed SOA server out of a Web service request, can be completed simultaneously in multiple components together in the background, complete query tasks will handle the results returned. Multi-tier server can be deployed on different layers as needed on a stand-alone server, certain servers set can also be deployed on a single hardware server. Flood prevention and the underlying data, business data, various thematic flood services, can provide customers with services is limited, it is impossible to completely meets all the requirements of customers and, therefore, without affecting the data under the premise of the original structure, based on the principle of the workflow, and application service composition patterns formed to meet the requirements of the data results. Through a variety of service metadata descriptions will be saved in flood prevention and collection of data from

![Figure 2 Service-Oriented application integration architecture for flood prevention system](image-url)
different sources of data using the wizard for which the remap, filter, mix, produced to meet the requirements of the new data set. This mode does not affect existing data structures that can be maximized to meet flood prevention needs business information services.

### 3.3 Exchange bus design of flood prevention information system

Based on the SOA model, allowed construction of flood prevention and SOA to work, you must establish infrastructure to support service. As SOA framework technology backplane is an enterprise service bus (ESB). A full of based on bus of schema, must has application service (service consumer), and application integrated (service bus) outside, also must has a layer "application adapter", application adapter main implementation and specific application system convenient connection of module of software, main solution application system and application integrated Zhijian of connection and information exchange, problem, implementation information of extraction, and package, and packaged, and classification, and encryption, and compression and transfer function. Adapter for each node is responsible for connection flood-Department of business and Office system message bus, that is, from the business sector, watershed and extract data to the Office system application integration system, receive adapters extract information from the message bus, combined with the business rules are applied to the local system. Application integration layer information sharing and exchange of information is the main service bus, is the basis for application integrate different systems. Through the use of integrated, loosely coupled connections between different application systems, realization of data transmission, routing, distribution of information. Main application integration to messaging and asynchronous communication technologies as tools for service-oriented architecture frameworks, service bus based on the XML description language for information integration between various applications. Plus the necessary support, management and monitoring of security measures, this interactive system designed based on bus architecture (see Figure 3).

![Figure 3 Overall design of interactive system](image)

### 3.4 Information sharing service designed for flood prevention framework

Based on the above research, the paper design by the application layer, presentation layer resources, sharing of spatial information exchange system layer, database layer framework for flood prevention and the implementation of shared services (see Figure4). Application level to the flood prevention sector users, resources, provide access to the portal presentation layer, and Web access services, space switching system layer provides a collection of shared services and exchange services, database layer, including flood prevention and metadata database and integrated database collection.

### 4 Conclusion

Construction of flood prevention is a complex information system engineering, flood prevention and information systems related to various types of data and business as a regional, distributed characteristics, in particular for different levels and administrative divisions basin, flood prevention and
information systems with different depth and breadth of applied. Service-oriented architecture-based software system for flood prevention, for quick access to various industry sectors flood of data, in order to achieve such as land, weather, communications and other industries sector to work together as government agencies to provide information support services, flood prevention, flood prevention functions at all levels that can be objective and scientific decision-making. At the same time, you can continue to expand based on application of this framework, to build a group based public warning system for flood monitoring and prevention of reference for ideas.

Figure 4 Implementation of Service-Oriented framework design for flood prevention information system

References


