

Design and Implementation of Power Trading Information Release System for SGCC

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Abstract—Power trading information release system is the State Grid Company's internal and external business information integration, establish a convenient service channels between the government, regulators, power generation companies and large users of electricity. This paper first analyzes Grid Company information release business needs, sort of information sources and distribution channels, then describe the overall structure of information release system, detailed description of information release services and processing design ideas, finally, summarize the characteristics of the system design, provide a reference for the design of power grid company information release system.

Keywords- power trading; information release; system design; power grid.

I. INTRODUCTION

To implement the State Grid company "four service" purposes, put forward new requirements for market services, at the same time the government and the electricity regulatory institution also put forward higher requirements for information public on the breadth and depth, thus requiring grid companies must improve the ability of the power of information released.

China's electricity trading information release system designed primarily two types, one is that all the information is publicly displayed data, there is no private information, such as information release sites, services lobby touch screen and large-screen display, etc.; Another is to create proprietary information exchange system [1-3], power companies based on the information provided by the user, with permission to access the account registration, user login

system via the internet, then you can query their private data, including independent Inner Net [4] and external information release website. With the increasing regulatory [5-6] requirements, require such information to be timely released, archiving, retrieval and processing of data about the operation and market transaction data, so that all market participants are able to get in the first time to the relevant market information, to carry out fair trade. But the limitations of existing systems restricted platform architecture, it has been difficult to adapt quickly to information release business development.

This paper describes the design of a power trading information release system, through information dissemination and management bus provides strong support for the release of information services and processing capabilities, enabling the system to adapt to the regulatory agencies, power generation companies, and other large users of electricity user information released differentiation needs, also supports the type of information released, the depth of content and expanding in the future, for the power grid company to provide a platform for interaction and external services [7].

II. REQUIREMENTS ANALYSIS

Information release system goal is to maximize the advantages of various media channels, to create a channel between businesses interact with customers, businesses and employees. Information release channels including SMS, Email, phone, fax, internal office e-mail systems.

A. Information Released Content. power trading and market information.

Within the scope of the electricity market laws, regulations, industry regulations, membership information in the market, bidding limit, bilateral trading intent, transaction charge, transaction price, billing information, power generation and consumption, average utilization hours of generating units, electricity forecasting information, power generation plan, the implementation of the transaction, etc., and all other information should be disclosed;

power grid operation information: changes in the structure diagram of power grid, power grid profiles, operation control limits, it is important operation the way, annual production plan of new equipment, new equipment put into operation, the maintenance plan, the completion of maintenance and power grid production safety situation, etc.;

Information on plant Operation: power plant overview, unplanned outage, thermal unit commitment peaking, generator frequency adjustment, voltage adjustment, situation operation assessment methods, and assessment, etc.;

Additional Information: Includes information for outsiders, such as the frequently updated content electricity news, announcements and notices, people focus, price information, as well as power trading profiles, which are not frequently updated content. For internal information: network news, posters, academic activities, technology updates and other internal employees daily work, learning and life related topic, as well as related work service guides.

B. Sources, Forms and Distribution Channels.

The main sources of information, such as Dispatch Center: dispatch automation systems, scheduling management information system; Power Trading Center: power trading operation system, electricity tariff settlement systems; Development Department: Production Analysis System; Finance: Financial management and control systems; Government Regulatory agencies: all kinds of posting, policy documents ; Generating Enterprises: production operations data; Electricity Users: electric energy metering data.

The main form of the information provided: Read data directly from the database, data exchange file (E files, XML files, Excel files), data exchange services (Web Service, SOA), directly through manual entry system, through streaming media interface (streaming media: text, images, audio and video).

Website: Wide range and wide, suitable for all participating members, but limited real-time information;

Dedicated Client: Application to the internal system to use, convenient, stable, real good, but small range;

Large display screen and touch screen: Information loyal, primarily serving power generation companies and large users, information real good;

Fax, e-mail and SMS: high efficiency, information professionals, narrow range, but too many types and the interface is relatively complicated.

III. OVERALL DESIGN

In the overall structure of the system is divided into upper and lower layers, the lower is the system interface for access to data from other information systems, the upper is information dissemination and management system function modules, the data exchange between the two through the middleware and data collection middleware interconnected fit , as shown in the overall structure of information dissemination system in Figure 1.

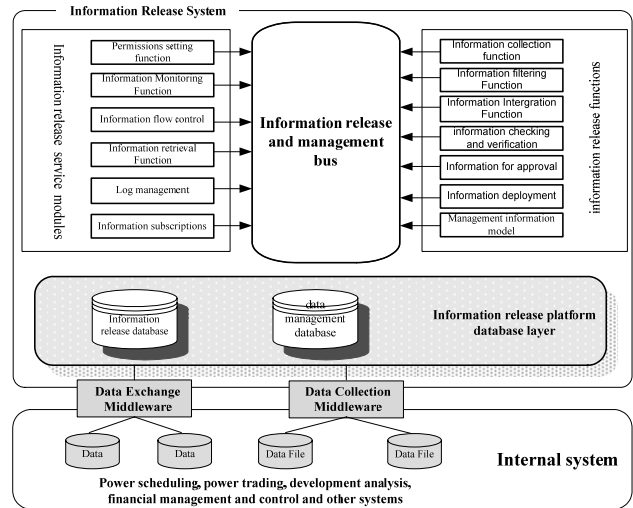


Figure 1. Diagram of Overall Structure

Due to the complexity of the data subject and information source systems, data exchange middleware is designed for those applications can provide standard data interfaces, providing the underlying data exchange service.

Data collection is for those who support and system coupling is not high, and the need to manually perform data reporting business data sources, providing standard data files and interactive features, such as manual fill manually upload data files, etc.

System database is mainly based on the data of the two data access mode access system, combined with the idea of a data warehouse for analysis and organizational topics, through data extraction, cleaning, screening, and finally the data is stored to the database.

"Information released modules", "information release service module" and "information release service bus" three parts mainly responsible for the information unit (minimum information entity information release system can handle) for processing, integration and provide a flexible, professional, customizable information release process.

IV. FUNCTION DESIGN

First, information publishing information collected through the application interface, and information filtering, information integration, information verification, approval and publishing process, and finally released by the Information deployment module. Information release process diagram shown in Figure 2, including information collection functions, information filtering, information integration,

information modeling and information checking function, information approval function, information deployment capabilities of several parts.

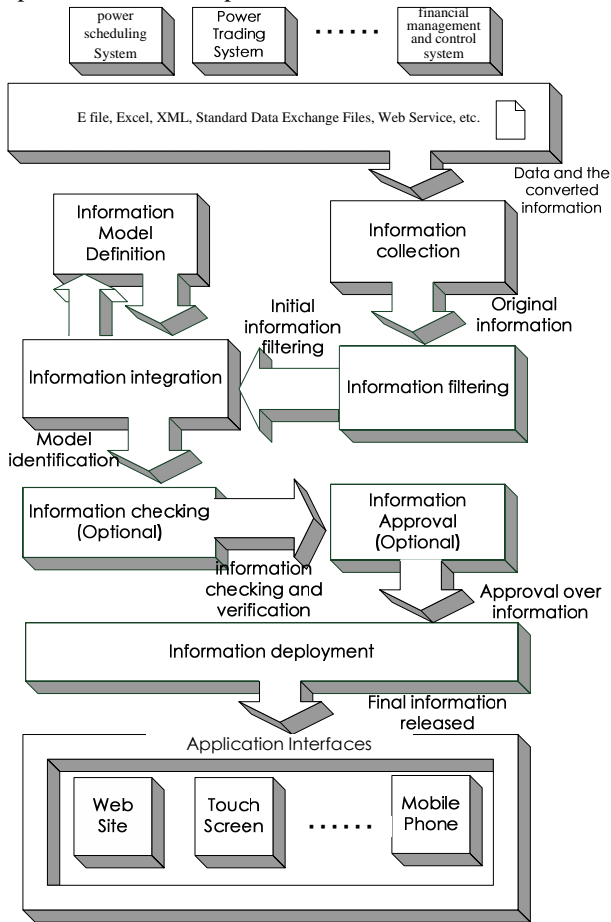


Figure 2. Information release process diagram

A. Information Collection Function

Power trading information related to the data more widely, covering many types of business, so the data collection and storage is needed overall design, data collection by establishing a mechanism to obtain the required data from different applications or data center, data sources including: power scheduling SG-OSS and OMS systems, power trading systems, development planning and analysis system, financial management and control systems. Design uses a unified standard data interface, through different configurations to achieve data collection.

Combined with data warehouse design ideas to achieve collect aggregate data partition to store data in accordance with the Category of business topics, use space for time and improve the efficiency of data retrieval. Under the premise of unified planning data, to develop uniform data standards and interface specifications, using the same strategy to integrate data of various business topics.

B. Information filtering Function

Information filtering function is responsible for filtering all the information collected, both to eliminate undesirable content information and content to repeat information.

- According to custom keyword filtering rules and information can be filtered to filter out all kinds of information sensitivity, errors, as well as violations of state laws and regulations.
- According to custom filtering rules to automatically delete duplicate content.

C. Information Intergration Function

Information integration function is based on the logic of information and different types of tissue weight redefined information between standardized information is formed, and then loads the corresponding information processing model, the last generation of structured metadata information, call for subsequent modules. Information integration function is based on the logic of information and different types of tissue weight redefined information between standardized information is formed, and then loads the corresponding information processing model, the last generation of structured metadata information, call for subsequent modules.

More information integration is to consider the specific needs of end users, including: data content (power generation, the power grid operation, etc.), the organizational form (E file, Excel, XML, standard data exchange files, etc.), the information submitted mode (active, passive, etc.). Provide special tools, flexible organization to customize the end-user view.

D. Information Model

Information model management function is rational organization of information, which is carried out transaction processing to achieve basic business functions. Information may be deployed in different formats in different sectors in information release, information model is the data processing organization, property settings, operation, and object oriented. It includes information model data sets, also access information data base unit; information unit, which is the core of the electricity market information service system technical support system release subsystem performance, the type of information units such as: forms information unit, forms information unit and other multimedia information unit, etc.; definition information element attributes, such as: whether the information checking, type checking, approval status, step approval, etc.; extended information unit properties that the user can automatically increase based on the business needs of the attribute information unit .

E. Checking And Verification

The main function is to verify [8] the correctness and rationality of data and give the user some hints about the data does not meet the requirements.

- Information model inspection rules. User-selected data model custom validation rules, such as data type, period, accuracy and completeness, upper and lower limits can be set.

- Information on data validation. According to user-defined inspection rules, data validation service is responsible for the background check data, the system automatically gives the validation results suggest that information and automatically generate check report.

F. Approval

This function is the main achievement of the information or documents reviewed and approved, with mature third-party workflow engine to achieve workflow services and information release system is highly integrated, through a graphical workflow management interface to achieve defined business processes for approval, monitoring, control and other functions.

G. Deployment

This feature is automatically deployed to achieve information on the display terminal in the specified period, it includes information decryption in secrecy period, published in unclassified cycle, and according to the different needs of the deployment to the information posted on the extranet sites, intranet sites, messaging platform or other terminals. Declassification of secret information security based on space-time decryption mechanism, the aim is to make information to decrypt all security encryption status in the entire life cycle. Using one-way synchronization data isolation devices [9] in power network and the network, to ensure that information is available, integrity, confidentiality, nonrepudiation and so on security.

V. SERVICE DESIGN

Information service work is a core in order to release to the external information, users can use the internet, text messaging, display screen or touch screen to subscribe, query and retrieve all types of business information needed by publishing services. The overall information release service module design shown in Figure 3, which includes: access control, information monitoring, information retrieval, information flow control sub-module, log management and information subscriptions functions.

A. Permissions Setting

First of all, initialized to all registered customer information, establish the user's basic information and roster data tables, and assign permissions to registered users in the system. In order to ensure the user information integrity and instant, we will through customer communication management of the maintenance function, regularly update the registration service list.

B. Monitoring

This function is to check and monitor information, feedback information sent successfully status, check the information channel. Module has a simple, quick definition interface, support for multiple types of alarm features and define the combination of information, such as: alarm parameters, alarm delay, alarm time, notify personnel; supports multiple alarm mode, such as: logging,

discoloration tips and SMS alarm, etc., and alarm information including reasons for failure, the components and their responsibilities. The system provides automatic and manual way to acknowledge a single alarm, alarm classification, grouping alarm.

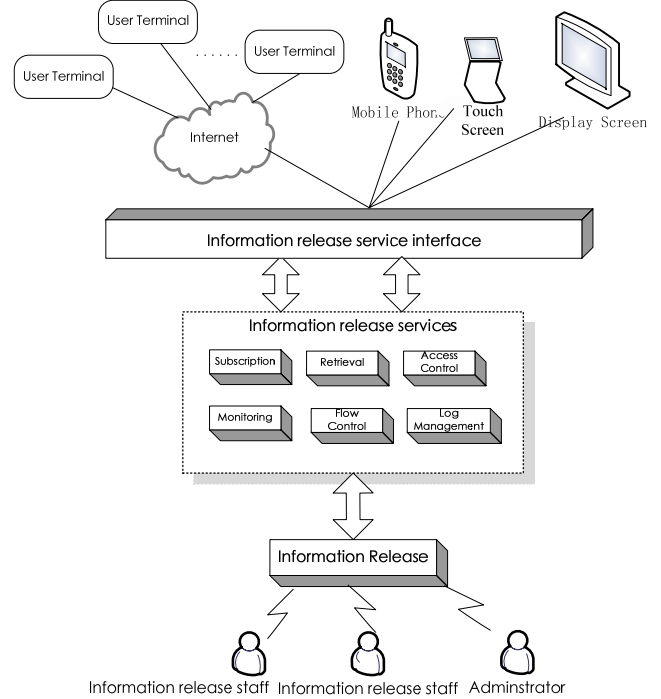


Figure 3. Information Release Service Function Block Diagram

C. Retrieval

This function includes site search and multi-information search.

Mainly used to implement external sites and information search within the site through the site full-text search technology, allows users to more easily access the site information, and full-text search technology also provides editorial staff presentation as information search and mining capabilities, making information more editors management and use of such information;

Intelligent information search based on multiple vertical intelligent search engines [10], it can help users get to the more specialized information, which cannot be limited only to text search on the page, also search the web content metadata, as well as a variety of information in documents, reports or financial statements.

D. Flow Control

This function is implemented by the recording priority processing tasks from the information management system, optimizing system will handle failure record or higher level through multi-threading, and support re-send when the channel failure.

E. Log management

System has improved logging, management and analysis functions, easy to find fault and daily management of the system. System logs include: system user login logs, illegal attempts to login logs, logs of information release, information browsing logs, file download logs, information file upload logs, system parameter modification logs, and other critical operations logs and so on.

F. Subscriptions

Support users to customize the order of system information, by ordering information will be sent to you by report, graphics, in the form of documents or messages, finally, system automatically sent to the e-mail or phone on the user's needs through the system background.

VI. CONCLUSION

This paper describes in detail the power trading information release system architecture for State Grid, functional and related services design, The system is designed to adapt to the government, regulators, power generation companies, large users of electricity and other types of users, their information release data discrepancies and scalability requirements. System design has the following characteristics:

1) A unified platform for public and proprietary information management, and unified management to complete the integration of the two types of information on a single platform. Public information is automatically posted on the website and other information terminals, users have direct access without authentication; proprietary information allows only authenticated users access permissions.

2) A unified data interface, the development of uniform data standards and interface specifications, combining the data warehouse ideas, through a configurable interface rules to implement data collection and storage, integration of various business units and systems business data.

3) Information filtering and monitoring capabilities, to achieve keyword filtering and rules from the collection of information and data, eliminating bad and duplicate information; background information monitoring functions

to achieve the release of information on inspection and monitoring, support alarm features to define, support for multiple alarms way, and provides automatic and manual mode to confirm the alarm message.

4) Released terminal supports multiple types, including information release extranet sites, intranet sites, messaging platforms, as well as touch-screen and large-screen and other types of terminals, supporting diversification interaction devices.

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