Research and Design of cement enterprise energy management system
Report Generation

Dongyuan Cheng¹, a, *, Qingjin Meng ², b and Shaohong Jing ², c
¹School of Electrical Engineering University of Jinan, Jinan 250022, China
²CVIC Software Engineering Co., Ltd, Jinan 250014, China
a18254136693@163.com, b cse_mqj@ujn.edu.cn, c cse_jsh@ujn.edu.cn

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Abstract. In the cement enterprise energy management reporting system plays a very important role, with analysis and comparison function cement energy data. The system uses XML technology and jQuery EasyUI plugin implements which a software development may accelerate reporting production systems. This article describes the main structure of the system, and introduces the format templates, data templates and jQuery EasyUI data parser implementation.

1. Introduction

Energy managementsystem to reduce energy consumption energy saving enterprises play an important role in the cement business, whereas the system can report energy consumption data in a clear and intuitive way to present to the operator or manager. It’s very easy to find out what caused the energy consumption too much reason to production management brought great convenience, but also for production scheduling and personnel management provides reference information. But the traditional format of a singlerereporting system, maintaining a huge amount of cement companies in different report formats vary, according to the traditional approach requires application developers to develop individually customized for each cement companies reporting system. Especially when change can’t be good business to adapt to change, then you need a programmerto rewrite the program to adapt to the new requirements of the report, it will increase the difficulty and the progress of developmentalprojects [1]. Therefore, reporting systems have an important role for reusable companies.

Now many companies use existing reporting software to develop reporting system, such as overseas have Crystal Report, Formula One, BRIO, BO, etc. It’s more popular domestic dry-run, the number of giant, UFIDAChinese table, or using their control. But the Chinese table style complex, although the software can complete functional requirements, but it is difficult to meet the customer's user experience, but expensive.

2. Key Technologies

2.1 XML Technology.

XML is an extensible markup language refers to, and is a markup language. It was very similar to HTML in most web applications. XML is used to transmit data, while HTML is used to format and display the data. Format and content of XML documents are separate, which the same content can be displayed in a different style [2]. XML stored in plain text, thus it provided an independent software and hardware data storage methods. This allows to create different applications can share data easier [3].

3. jQuery Easy UI Plugin.

Easy UI is based on jQuery UI plug-in collection. It does not need you to write a lot of javascript code, and just write small HTML code to define the simple and beautiful user interface. Secondly Easy UI perfect supports HTML5. Easy UI can save a lot of time for your web development to achieve good compatibility [4]. This system is mainly used Easy UI plug-in is DataGrid and TreeGrid plugins.
2.2 System Design and Implementation.

System’s Structure. The overall architecture of the system as shown below:

![System Architecture Diagram]

The overall architecture of the system as shown below:

- **Report Template Library**
- **Database**
- **Extract / Save Template**
- **Database Search Engine**
- **Report Format Template**
- **Report Data Template**
- **Data Parser**
- **Production Report**
- **Preview**
- **Print**

The system design goal is to quickly complete report design work on a user-friendly platform. There is a port template library by the report templates and report data form at template composed of both template s, and the scribed by XML language. Data parsers combine these two templates to generate report json data form at required. The database searching engine is responsible for reading the information from the data query template, and then executing SQL queries to query data from the database. The data flow shown in Figure 2:

![System Data Flow Diagram]

**Fig. 2 System data flow**

**Design Report Template.** The main module of the system is included: report format design module, report data template module, report data analysis module.

**Report Format Module.** Traditional reporting system format design requirements in the program are designed specifically for each style, such as a merger, the column width set, binding the report header information in the cells of the field should be set by programming. When users need to change the reporting style, the table must modify source code, increasing the difficulty of system maintenance.

The system can be used to generate the required Excel reporting style, adjust the width of the cell, and the need to merge the cells in Excel to adjust, fill in the fields of information need to be bound in the downward header. There are formulas also add specific formula to the appropriate cell. Then the final report template generator will be loaded into Excel format template builder, choose a good header of the region and bind the appropriate fields, and then convert to the desired Excel XML file.
Figure 3 is "Energy consumption Month Analysis Report" Format Template Builder screenshots.

Exported XML file formats:

```xml
<Data>
  <DataItem name="Coal consumption">
    <bindField type="field">CoalDustConsumption</bindField>
    <mDataType>decimal</mDataType>
  </DataItem>
</Data>
```

**Reporting Data Template.** Report data template XML file format is as follows:

```xml
<Data>
  <DataItem name="Coal consumption">
    <bindField type="field">CoalDustConsumption</bindField>
    <mDataType>decimal</mDataType>
  </DataItem>
</Data>
```
is the SQL portion of the datatemplate, its child nodes <DBType> stores the type of database, the above XML fragment <DBType> node data for the "SQL Server" Description Databasetype to connect to SQL Server type; <ConnectionString> information is stored in the database connection string, <SQLString> node stores the SQL statement to be executed.

SQL database search engine first reads part of the connection information about the database, based on different database connection type selection <DBType> node database described a suitable method, after reading the connection string information <ConnectionString> node, and establish a database connection, and finally execute SQL query that returns database query records.

Database search engine application design pattern of the factory model, and the application of reflection technology that enables different types of database operations, met object-oriented design principles of opening and closing.

2.3 Implementation of Data Parser.

Easy UID at a Form plug (datagrid) to display data in a tabular format, and provides a wealth of support for the selection, sorting, grouping and editing data. Tree Form (treegrid) is used to display hierarchical data in a grid, which is based on the data table (datagrid), combined with the treeview (treeview) and editablegrid. TreeForm (treegrid) allows you to create customizable, expandable rows asynchronously and display hierarchical data in multi-column format. They have their own specific JSON data format. By designing two dedicated C# classes that encapsulates the data conversion, DataGridJsonParser class encapsulates the desired type from Data Table to Datagrid type of conversion; TreeGridJsonParser class encapsulates the data type conversion from Data Table type required to Treegrid.

DataGridJsonParser class provides the following interfaces:

Public static string DataTableToJson (DataTable table, params string[] columnsToParse);
Public static string DataTableToJson (DataTable table, int myRowCount, params string[] columnsToParse);
Public static string DataTableToJsonByLevelCode(DataTable myTable, string levelCodeColumn, params string[] columnsToParse);
Public static string DataTableToJson(DataTable table, string idColumn, string parentIdColumn, params string[] columnsToParse);

4. Applications

In currently, this system has been well used in domestic large-scale enterprises for cement. This system compared with the previous reporting system to improve the flexibility of the system and reduce the operating personnel and report query reporting staff. And systemis purpose for finding out the result in terms of high energy consumption, reducing the energy consumption of cement enterprises, improving the cement business benefits. In addition, this system is based on
B/S architecture and convenient, eliminating the C/S architecture tedious configuration and maintenance and up gradecosts.

5. Summary

Based on the current production system on the basis of the current report analyzes the proposed XML-based report generationsystemof ideas. And through XML technology and jQuery Easy UI plug-in implements the basic function on the basis of the report but also to meet the requirements of complex Chinese reports.

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References


