Complete Sets of Electrical Equipment Aided Design Research

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Abstract. Computer aided design (CAD) is used in the design of complete sets of electrical field is divided into mechanical CAD and professional electrical CAD (ECAD) phase. At present, most commercial ECAD software is based on the mechanical CAD software secondary development of products, on the one hand, keeping mechanical CAD design function, in order to realize the mechanical design requirements, on the other hand through the secondary development to realize the electrical professional design features. The differences due to mechanical CAD platform, and the differences between different platforms of geometric kernel, as a result, this kind of commercial ECAD software common platform transplant difficult problem of poor compatibility and drawings. Based on the above problems, this paper around the complete sets of electrical technology application in the electrical design, on the basis of reference to other electrical CAD software, conducted a tentative research. First complete sets of electrical cad key technology is analyzed, at the same time of complete sets of electrical interface has carried on the design and implementation, and verify the results.

1. Introduction

Complete sets of electrical equipment, also known as electric equipment. Shells of it is to point to by bus, a secondary element, auxiliary materials, etc, realizing the function of an electrical function or multiple electrical complete equipment. Complete sets of electrical equipment is usually divided into two categories, high voltage integrated and low voltage complete sets of equipment. Complete sets of electrical equipment belong to the basic equipment manufacturing, used in power generation, transmission and distribution and power consumption, receiving and distribution of electric energy role. Role to play in control and protection of power equipment, is closely related to industrial production and living. In recent years, along with our country electric power energy infrastructure construction investment and development, the demand of electric equipment increases year by year, its product market competition is increasingly fierce, how to improve the efficiency of the design of the product, has become a complete set of electric enterprise development of the key factors.

2. Complete sets of electrical cad key technology

2.1 Object-oriented framework structure design

Design rationality, reusability and extensibility is the core elements of software architecture design. Object-oriented technology to object as the basic elements of design. Objects can be either data, also can be. The software system as a collection of discrete objects.

Using object-oriented design the main objective to improve the readability and maintainability of software and reusability. Using object-oriented design application framework can clearly express system concept, to facilitate analysis and code implementation, from the software requirements analysis to the software function design easier, effectively reduce the design cycle, and reduce the cost of software development [2]. In addition, the object-oriented technology in providing mechanisms such as inheritance, encapsulation, polymorphism, and provides further support for software reuse. System should provide a powerful configuration interface, the completion of secondary schematic drawing, through a simple setting that can automatically generate secondary wiring diagram, shorten the construction design cycle, improve design efficiency. System provides powerful electrical symbol library, can be classified according to the habits, convenient call, reduce

artificial operation error. Using this system configuration can easily generate opening chart and layout.

From the application level, the platform should have the characteristics of simple operation, easy to master, easy to maintain, to meet the needs of many layers applied personnel, realizes the minimum cost with different CAD software integration, specific to the design personnel, as long as the understanding of complete sets of electrical design process, through the simple learning can independent operation, quick to master.

The implementation of the data information and PLM system layer integration, realizes the data and ERP integration, realize the integration of the electrical design software and CAD platform, so as to realize information sharing. Among them, the information integration in the implementation of complete sets of electrical design of various types of data processing, and hide the details, for the user to provide uniform and transparent interface for a visit, is the core of the system integration.

2.2 geometry class library framework design

With the development of CAD and calculation and graphics technology, key technology such as geometry modeling has been quite mature. Market better CAD will provide secondary development interface to realize the enterprise localization features custom needs. Because, the different mechanical CAD software platform provided by the secondary development interface is there are differences, and because the existence of commercial competition, secondary development interface is not compatible with each other, the secondary development of electrical cross-platform transplantation and application of CAD is difficult.

Cross-platform parametric modeling of common, geometric description with geometric kernel can be divided into different levels to achieve [3]. In this paper, the idea of object-oriented design, interface class encapsulates the special geometry to describe the characteristics of geometry information, and encapsulates the 2-d geometric related operations, related to electrical CAD geometry and operation has nothing to do with the underlying CAD thoroughly, encapsulation, independence and good extensibility. In order to make electrical CAD program can smooth transition between the different underlying CAD software, the interface for a particular, with the underlying interface encapsulate CAD platform related drawing function, through the interface makes the electrical CAD software application layer and the bottom of the bridge CAD platform, finally realizes with the minimum cost to realize the cross-platform application of electrical CAD software.

2.3 symbol library storage design

Because of the complexity of the database application system, the best design will not happen overnight, the database design is a planning and structured data in the database object and the relationship between the data object iterative process [4].

In reference to previous design, on the basis of this article, extending the symbols of the electrical property definitions except with the symbol attributes, each symbol with electrical properties information. Constitute the basic database of symbol design is: the electrical components table, graphic symbol table, connection point table, elliptical/oval arc table, table, round table, writing table, point table, linear table.

Geometric table includes: POINT table (GEO POINT S), storage of graphic symbol POINT entity data; Linear table (GEO LINE (S), storage of graphic symbol of linear entity data; Round table (GEO CIRCLE S), storage of graphic symbol round entity data; Circular table (GEO ARC S1, storage of the circular ARC of the graphic symbol entity data; oval/elliptic ARC table (GEO the ELLIPSE S), storage of graphic symbol of the ELLIPSE/elliptic ARC entity data; text table (GEO_FONT S), storage of graphic symbol character entity data.

3.Design and Implem Entation of Complete Sets of Electrical Interfaces

3.1 system layer database access interface

The idea of object oriented, definition CADOConnection, CADODataset class, realize the ADO database access, access the database through ADO way, can do nothing to do with the database engine platform.

Class CADOConnection inherited from CObject class provides the function of the ADO to connect to the database collection. Call a method: first call the constructor construct a CADOConnection object, then calls the ConDB or ConDBByConnectstr method, establish a database connection.

CADOConnection class design as follows:

Class CADOConnection：public CObject

{

public：

／／1. The structure and the destructor

CADOConnection0；

virtual--CADOConnection0；

DECLARE_DYNCREATE(CADOConnection)；

public：

／／2．database connection：open ConDB

bool ConDBByConnectstr(CString sConStr)；

bool ConDB(CString DbName，CString Password=--T(" ")，int DBType20)；

／／3．Open Database

bool Open(LPCWSTR lpstrConnection 2-T(" "))；

bool Execute(LPCWSTR lpstrExec)；

／／4．Set the connection string

——ConnectionPtr GetActiveConnection0；

void SetConnectionString(LPCWSTR lpstrConnection)：

CString GetConnectionStrin90；

／／5．TP

long BeginTransaction()

{return m_pConnection->BeginTrans0；}

long CommitTransaction0

{return m_pConnection->CommitTransO；}

long RollbackTransaction()

{return m_pConnection．->RollbackTransO；)

／／6．state mark

bool IsOpenO；

void Close()；

protected：

ConnectionPtr m pConnection；／／；database connection

CString m strConnection；／／：the connection string

Class CADODataset inherited from CObject class provides ADO database access the result set of functionality set operation.

3.2 system registry access interface layer

Software configuration information, record with the registry, and some design Regbasic interface, the interface is mainly realize the registry to read and write operations, a method is called: Regbasic class as static interface classes, methods are static, can be called directly, no need to build Regbasic object, system integration calls through the corresponding COM interfaces encapsulate implementation.

3.3 the application layer symbol preview interface

The application layer to provide multiple public application service interface elements is given priority to, in the application layer of the packaging graphics preview control class design as an example to explain design ideas and implementation process, the control internal encapsulated OPENGL interface, provide electrical symbols graphics preview function.

CPicBoard inherited from CListCtrl class is shown in figure 1. Internal call OpenGL method to carry on the functions of vector graph drawing board. In this project is mainly used for: preview shows the electrical geometry symbols.
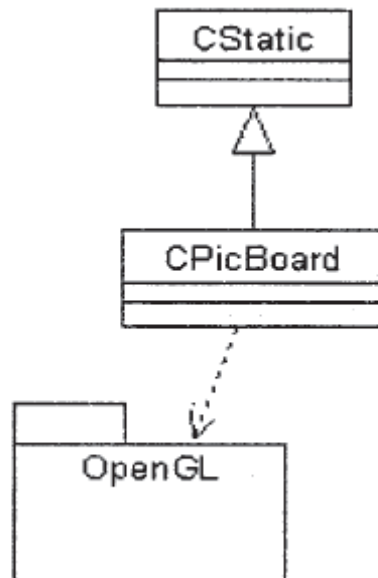

Fig.1 CPicBoard Class Hierarchy

3.4 user drawing template interface

User layer USES the object-oriented design method, to establish a reasonable model of the information. Information model based on objective things scientifically induction, summary, abstract, and be able to adopt the method of computer language can be expressed to the objective things to describe the data model. Information model of the highest level of logical data model, it can accurately reflect the objective world of the application system constraint relations between entities, attributes, entities [5].

Class CPaperTemplateBasic implement drawing sheet and the parameters of the title bar configuration, the function of the interaction, such relations as shown in figure 2.
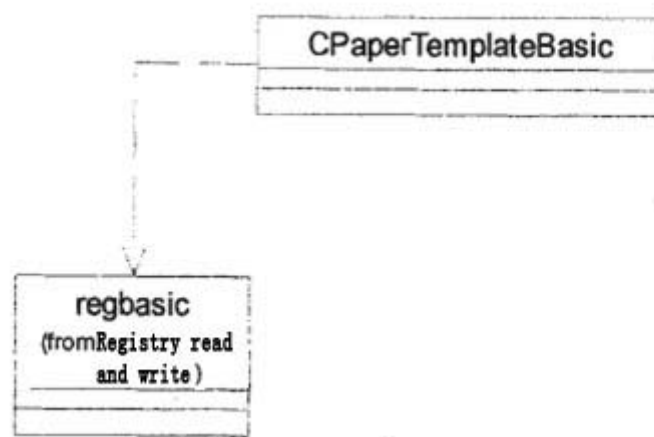

Fig.2 C Paper Template Basic Class Hierarchy

4. Conclusion

Complete sets of electrical market competition is intense, can meet the demand of enterprise design tools software can improve the efficiency of the electrical design, to reduce the enterprise cost, increase the market competitiveness of enterprises. This article around the complete sets of electrical technology application in the electrical design, on the basis of reference to other electrical CAD

software, conducted a tentative research. First complete sets of electrical cad key technology were analyzed.And at the same time of complete sets of electrical interface has carried on the design and implementation, and verify the results.

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