Visual Flexible Coding System Design Based on FSM

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Abstract: According to analysis of manufacturing enterprise coding requirements, Visual flexible coding system (VFCS) is proposed based on code classification theory. It has four function modules: code structure design, code segment & bit design, visual coding and interpreting, code query. Firstly, code rules are expressed by extendable XML format as data structure. Secondly, code design is regulated into two stages: code structure design and code segment design, so as to realize separation of code structure logical and contents. finally, code segment structure information is described as graphic nodes, using interactive graphics drawing for visual modeling, finite state machine algorithm are used implementing code structure interpreter.

Keywords: Encoding, FSM, XML, Flexible

1 Introduction

Encoding is a kind of information identification method adopts classification and meta-data to describe object characteristics. after implementation of encoding rules, two problems arises: 1, code classification is professional technology, for general people it is difficult to modify and understand, encoding rules are only meaningful for professional persons, in other words, only professional can design practical and useful code rules; 2, results of code segment and bit abstraction make only trained professional can understand the specific meaning of code then hinder the coding personnel managing the information. Flexible coding system has advantages of code structure adjustable, length and content can be changed later, so it is expandable and robust to the code system. It can avoid the above two problems, through converting code Specification Report to a computer software documents, distribution and renewal of code rules become easier. When professional personnel generate code under the guidance of the software, it has high efficiency and not easy to go wrong. Flexible coding system combines advantages of computer efficient auto-generating with manual flexible processing, so VFCS is a practical application.

2 Technology summaries

XiaoXiuJian discuss the coding principle and object-oriented coding model, and puts forward some coding rules can be unified with tree structure [1]. YangBinHong, WangJunBiao aiming at information management put forward to establish related code system [2] and hope that coding standard can be unified through the ontology of technology [3] and coding roles, the study results to establish of the theoretical basis and certain coding method. In the technology of coding tools, Zhangjin realize flexible coding by rules analytical, confined in the programmer can design encoding rules, powerful but not suitable for information standardization personnel. PangZhiJun puts forward and realize visualization flexible coding concept based on database[5], avoiding programming, but still need to database knowledge and skills to design coding rules,can not achieve goal.

Now, function of encoding modules in ERP,PDM can not satisfy VFCS, main problems focus on:1, Code structure design is complex. Code that makes up the structure between code segment of the relationship, for the enterprise the shorter length of code will be used express coded information, the more complex in code design. 2, code structure and contents often need to be

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adjusted. after the completion of the Code structure design, the next step is to design segment content, because the coding rule is not verified in the enterprise operation, content of segment is not very precise in default, need to be modified in practice though out the operation of enterprise, fast response design tool is required to complete this demand.

3 Demand analysis

In application, visualization flexible coding system has the following requirements:

· The description of the code segment should be simple, intuitive, and have interactive graphic interface, suitable for the non-programming person to use.

· Can visual, fast(intuitive) establish encoding rules, file storage of coding rules should be independent of OS, not using the database fields storage, can be parsed and distributed from this machine.

· Coding structure and length can be adjust, synthesis of code segments can be configured in practice.

· The relationship of between code segments can be used to describe by logical rules.

· Popup information for each code segment of the corresponding values should be unified interface, user-friendly and can be switched in different page.

· during encoding , the tips of each code segment should be highlighted, the input character for code can be edited or deleted, can auto check completeness of code

· Code database can be inquired according to segment, and support composite or multi-section query

· Simple code library management functions, including modification and deletion of code

Through the above discuss of enterprise demands, Code design work mainly finished by the information manage staff, then release and distribute of code rules, engineer or technical personnel in the production continuously put forward adjustment demand of code content, so code design and application process is as follows:

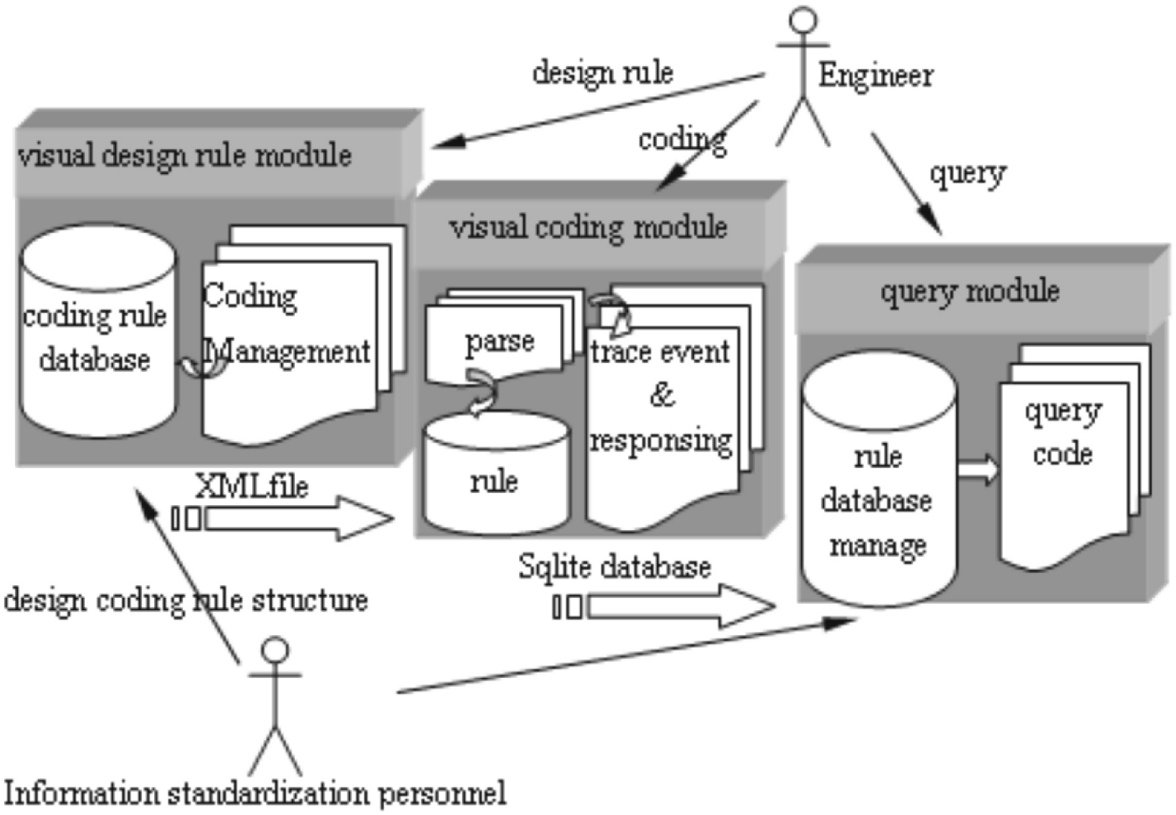


Figure 1. encoding system frame

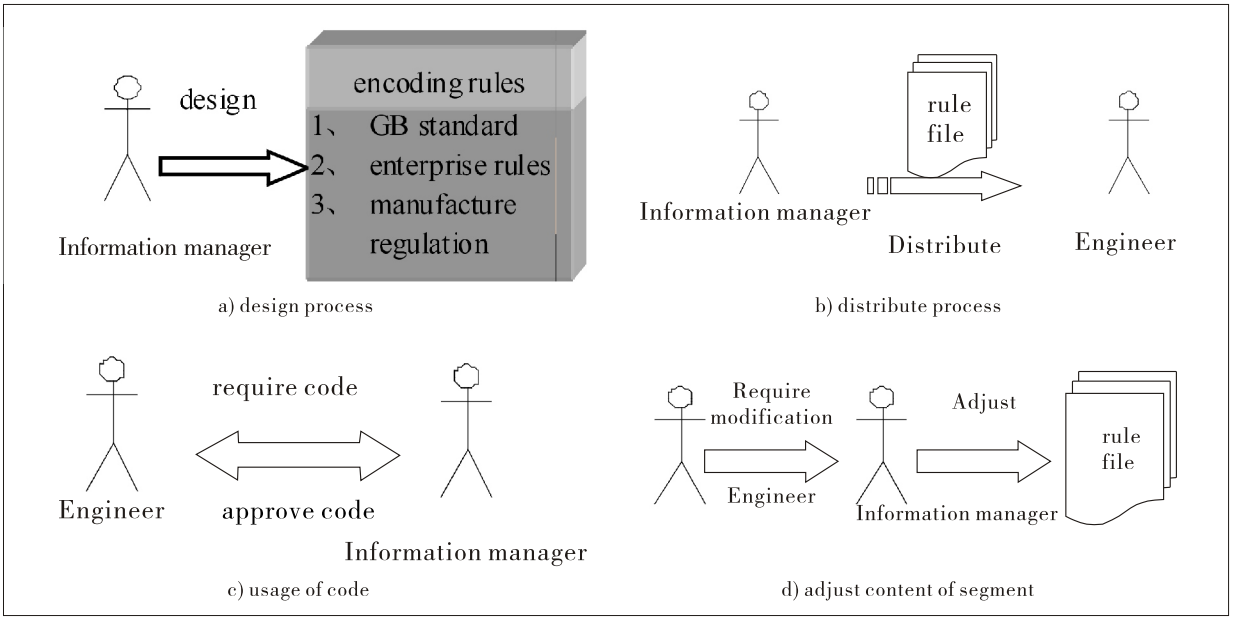


Figure 2. design and usage of code

4 Visual code structure design based on finite state machine

Description of the code structure and visualized modeling .This paper use visualized modeling for realization coding structure design. The following information is for coding structure definition:

· Start node. Starting point for encoding figured with the green circle.

· End node. Stands for encoding process has completed, figured with red circle.

· Segment node. Contains level code segment, fixed code segment, auto increasing code segment, figured with rectangular box in graph.

· Logic node. Stands for logical judgment, figured with blue logical expression.

· Jump node. When the encoding process is more complex, child code structures is used for stand for one position of the whole, figured with crossed rectangular box in graph.

· Jump from node. Start node of child code structure, figured in green rectangular.

· Association. Link of nodes, figured with arrow line.

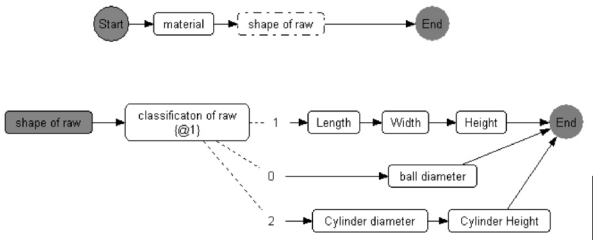
For code structure information, map constructed by graphic nodes are interactively established for logical structure, the map is a direct graph, and is modeling by three steps:

1. User interactively draws many nodes in graph area.

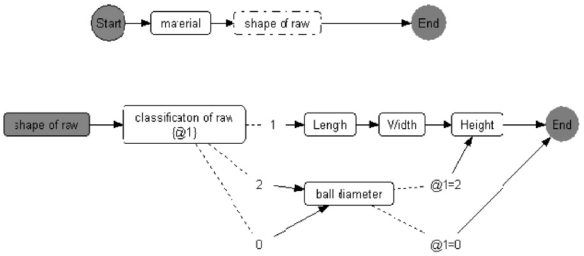
2. Fill in the content of node. For segment node, name and variables are input for identification, for logic node, the input is logic expression. Segment node can have state, user input character is segment node state, participate in logic operation. The logical expression allows simplification, namely omitted "=" symbol, when variables expression is default (use previous node state value).

3. Linking nodes. When segment node (former) and logic node (next) involves relation, said that the segment of user input character is in logic, according to user habit, logical judgment value on the right hand, dotted line is used for mark. When segment or logic node (former) and segment node (next) involves relation, said that code segment for coding should go on, line with arrows is used for mark.

Follow figure 3 set up raw material code structure information, including material information and shape information, according to obvious, implied logic expression, two ways to create logic structure model are shown.



a) obvious logic expression



b) implied logic expression

Figure 3. visual model for raw material encoding rule

5 Summary

In this article, through the analysis of enterprise encoding demand, encoding rules design are separated into two stages structure design and segment content design, take advantage of XML file format to realize expansion of rules description, design a scheme that various graphics node and arrowed line stands for different code structure information, then realize visualized modeling, combined with finite state machine theory and directed graph of traversing algorithm to realize efficient, reliable analytical of code structure, according to logic judgment ,lead to user input order, Realize the complete separation of code structure and content, design encoding rule can be collaborate with two roles, division is clear and definite, programmer is in charge of visual modeling and interpreting map, professional information manager is in charge of encoding rule content , need no programming knowledge, so VFCS achieves maximum flexibility and promote design efficiency of encoding rules greatly.

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基于有限状态机和XML的可视化柔性编码系统设计

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摘　要：通过对制造企业编码的需求分析，依据编码分类理论，提出可视化柔性编码系统（VFCS），对VFCS系统进行功能模块划分，由代码结构设计、码位内容设计、代码输入与运行解析、代码查询4部分组成。首先，完成了开发平台选型以及编码规范XML数据结构描述，使之具有实用性。其次，将代码规范设计分成结构设计、码段内容设计两个阶段，实现代码逻辑与内容相分离。最后，通过将代码结构信息定义成图形节点，利用交互绘图操作进行可视化建模，用有限状态机和有向图遍历实现代码结构解析，完成了VFCS系统设计。

关键词：可视化柔性编码；代码结构；有限状态机；XML

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