

# A XML-BASED RESEARCH ON INTEGRATION TECHNOLOGY BETWEEN PDM AND ENTERPRISE CONTENT MANAGEMENT SYSTEM

Chuanhong Zhou, Jigan Zhan

*CIMS & Robot Center of Shanghai University, Shanghai University, China; Email: [chzhou@staffe.shu.edu.cn](mailto:chzhou@staffe.shu.edu.cn)*

**Abstract :** The advantage of XML in Enterprise Application Integration(EAI) had been investigated , putting stress on the exchange of non-structural data between PDM and Enterprise Content Management System(ECMS) ,giving the integration prototype system model based on XML and introducing the algorithm of transforming the structure tree and the method of serializing XML document object to realize the core block—parser . The results show that the technologies solve the information “isolated island” among enterprise application systems, which has the meaning at large.

**Key words:** PDM; ECMS; XML; integration; XML Object Serialization

## 1. INTRODUCTION

With the rapid development of network technology, network scope are expanding, information resources appear different isomer, distributing, loose characteristic of coupling. Meanwhile, with the globalization of the market, the increasing aggravation of the market competition, the connection among modern enterprises is becoming more frequent, cooperative in forming alliances, and the working way has the characteristic of colony 、 interaction 、 distributing and collaboration .Enterprise Content Management System (ECMS ) can gather, manage , store, save and submit textural and multimedia content across and between enterprises, it is the important conjunction between enterprise's customer-oriented application and deal

---

*Please use the following format when citing this chapter:*

Zhou, Chuanhong, Zhan, Jigan, 2006, in International Federation for Information Processing (IFIP), Volume 207, Knowledge Enterprise: Intelligent Strategies In Product Design, Manufacturing, and Management, eds. K. Wang, Kovacs G., Wozny M., Fang M., (Boston: Springer), pp. 619-624.

within the enterprise So, ECMS may be as the information integration platform while structuring the Enterprise Information Portal (EIP), which realizes the information share between various kinds of enterprise information system(for instance: PDM, ERP, CAX).

As a part of structuring EIP, our paper has proposed a kind of integration framework between PDM and ECM based on XML, and have introduced relevant technologies.

## 2. SYSTEM INTEGRATION FRAMEWORKS

PDM manages all information correlated with product development (Including project norm, electronic documents, scan the picture, CAD/CAE/CAM file, product structure, products order, supplier state, etc.) and some related process (including Work flow, Approve / Release process, Engineering Change)<sup>1</sup>. In order to make all in products life cycle participants including customer, supplier participate into the design process from the beginning of product design, two kinds of information need transmitting from PDM system to the enterprise content management platform First some generic document can be generally imported by hand, second exists some non-structural data relying mainly on designing BOM (D-BOM) information. In our paper we mainly resolve how to import design BOM into ECMS accurately and timely.

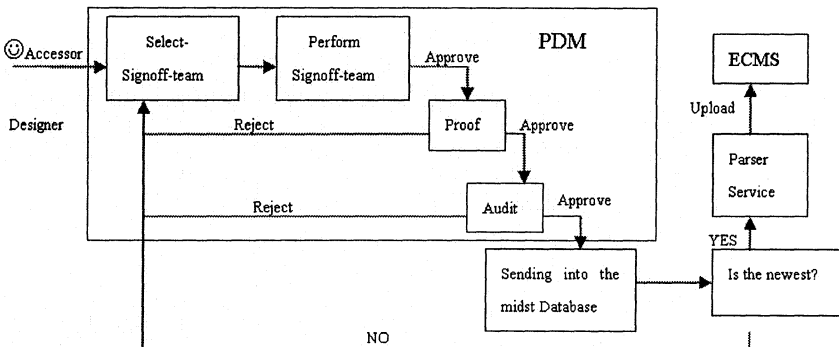


Figure 1 an Overview of Integrated Framework

Among this integrated framework, designers release these design information (D-BOM) in the form of enclosure through the native workflow engine of PDM. If the auditor approve, these information will be sent into the midst Data Base in XML-format<sup>2</sup> and transfers its special trigger to judge whether this information is the latest edition. If YES, transfer outside web

service – parser to realize datum format-transformation, extract the useful information from D-BOM and upload it into ECMS’s Data Base .At this moment, utilizing ECMS’s embedded workflow template, ECMS system manager can release related design information into the EIP.

### 3. CORE FUNCTION MODULE---- PARSER

The Parser module fully takes the advantage of XML in data exchange, adopting XSLT template and XML Object Serialization<sup>3</sup> technology, so that we can realize conveniently the format transformation of structural and non-structural data exported from PDM system.

#### 3.1 Parser Model

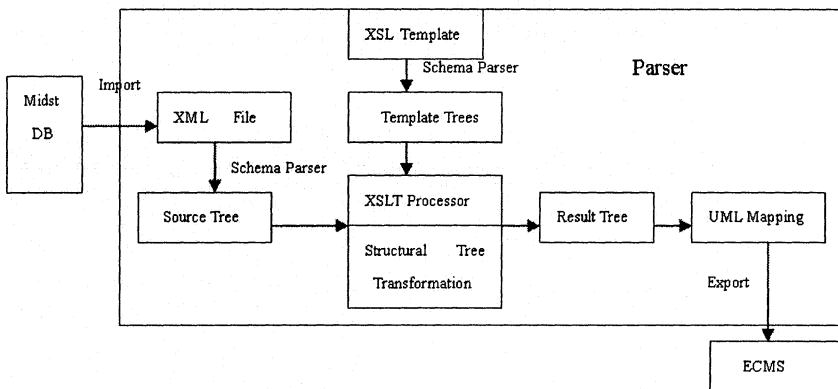


Figure 2 Parser Model

First of all, the Parser reads the D-BOM information that is expressed with XML format from the midst database , transferring corresponding XML Schema parser to parse the input file and XSL template file, showing for tree structure - source tree and template tree; Then XSLT transfer corresponding template rules in the template tree to carry on structure transformation for source tree , reject those sensitive information to supplier and customer, draw a XML file with " standard " pattern; According to the particularity of two systematic data interchange finally (it is necessary to share synchronously the outside non-structural datum linked with "locationRef" element in result tree’s Dataset node ),serialize the result tree by using UML Mapping and export the result into ECMS .

### 3.2 Algorithm of the Structure Tree Transformation

Begin

1. Input XML file, transfer schema parser and parse it into the tree-like structure
  2. According to the designated source schema , carry on the legitimacy check of the source xml file.
    - If false
      - Print " XML file pattern is wrong "
      - Return
    - Else
  3. Transfer XSL template and transfer corresponding schema parser to parse it into the template tree
  4. Read the root node of the source tree, look for a template rule to agree with nodal name to deal with in the template tree
    - If template rule number > 1
      - Determine to suitable template rule to deal with the root node according to the value of priority attribute
      - Else if template rule number=1
        - This template is needed.
      - Else if template rule number=0
        - Transfer inside template rule
  5. Carry out the template rule
    - If "select" attribute exists
      - Enumerate and Carry out specific node and son's nodal corresponding template rule that "select" attribute appoint
      - Else
        - Enumerate and Carry out the present node and sub nodes
  6. Output the result tree
- End

### 3.3 XML Object Serialization

Utilizing XSLT format-transformation technology can conveniently convert XML format file into HTML, text file and PDF,etc<sup>4</sup>. However, in result tree there is a "locationRef " element behind Dataset node which can link with some outside dataset (Word document、CAD drawings .etc). At this moment, utilizing XSLT<sup>5</sup> is unable to send synchronously these outside datasets and other structural datum into ECMS. So we utilize XML Object Serialization technology to map XML document into a normal class, and "locationRef " is a attribute of this class. Using Object-Oriented (OO) method can conveniently satisfy the demand of two systematic information integration.

Fig. 3 has explained how to map XML document into a UML object's instance.

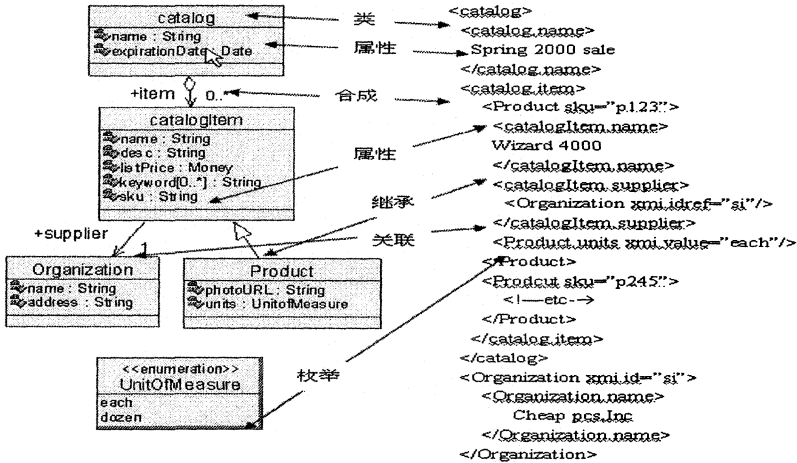


Figure 3: XML Document Mapping into UML Object's Instance

#### 4. AN IMPLEMENTATION

```

000005-底座
├── 000005
│   ├── 000005-view
│   └── 000005A-底座
│       ├── test
│       ├── 000005A
│       ├── test
│       ├── 000005A-view
│       └── view
└── 000039-螺栓
    └── 000039-view
        └── 000039-view

<?xml version="1.0" encoding="gb2312"?>
<PLEXML xmlns="http://www.plmxml.org/Schemas/PLMXMLSchema"
  schemaVersion="5.1" date="2003-03-16" time="15:36:47" author="TcEng - info@sapPPDMSTR-9000_2(241747429)">
  <header id="r1"></header>
  <Product id="112" name="底座" productID="000005">
    <Description>针对液晶显示器开发的新型底座</Description></Product>
  <ProductInstance id="000039" partRef="#1453" sequenceNumber="10">
    <ApplicationRef version="1.5skqjV1ghDXeB" application="TcEng" label="螺栓"></ApplicationRef>
    <UserData id="1454" type="InstanceNotes"></ProductInstance>
  <Task id="14166" state="设计中"></Task>
  <DataSet id="14161" name="UGMASTER ProductVision data" accessRefs="#1410" version="1" memberRefs="#14162" type="Direct"
    <ApplicationRef version="wF2od100ghDXeB" application="TcEng" label="wF2od100ghDXeB"></ApplicationRef></DataSet>
  <ExternalFile id="14162" accessRefs="#PLEXML(PLMXML-doc/1410/prt-doc)" locationRef="000005-底座.prt" format="prt">
    <ApplicationRef version="wF2od100ghDXeB" application="TcEng" label="wF2od100ghDXeB"></ApplicationRef></ExternalFile>
  <Form id="122" name="000005/底座" accessRefs="#1410" subType="ItemRevision Master" subclass="ItemRevision Master">
    </Form></PLEXML>
    
```

Figure 4 Design BOM (D-BOM)

We have adopted TeamCenter Engineering of UGS. and Plone while implementing the information-based project for FEIYUE Group, China. Through using the system integration framework mentioned above, we have

released smoothly the D-BOM ( Fig.4 ) in TeamCenter Engineering into Plone systematic platform.

## 5. CONCLUSION AND FUTURE WORK

In conclusion, through an actual project, the integration model which this paper adopted we have succeeded in solving the structural and non-structural data interchange between PDM system and Enterprise Content Management System (ECMS). Because XML language is an international industry standard, presently most corporations support this standard, the successful implementation of this integration model will offer strong technical support for enterprise application integration (EAI) in the future which is based on Enterprise Information Portal using ECMS.

At the same time, present research still concentrates on the single-direction data integration mainly. In the future, integrating enterprise application systems in double-direction., making the information of ECMS feedback into enterprise's other information system accurately and automatically will be our research emphases.

## 6. REFERENCES

1. Li Haifeng, Wang XianKui, Wu Dan . Research on Product Data Exchange Among Heterogeneous PDM Systems Based on XML[J] *Aviation Precision Manufacturing Technology* 2003, 39 ( 1 ) : p.20—24 (in Chinese)
2. Xu Xiangzhong, Wang Jingye ,Jiang Haibin . XML-based DIF and Challenges It Faces[J] .*Computer engineering and application* 2003,(01): p.27—30 (in Chinese)
3. David Carlson .Modeling XML Applications with UML [M] . Tsinghua University Press , 2003 (in Chinese)
4. David Carlson .*Modeling XML Application with UML[M]* : Rational Software Corporation, 2003
5. Chen Jianxuan. *Introduction to Mastery for XSLT [M]* . China Railway Publication House ,2003 (in Chinese)