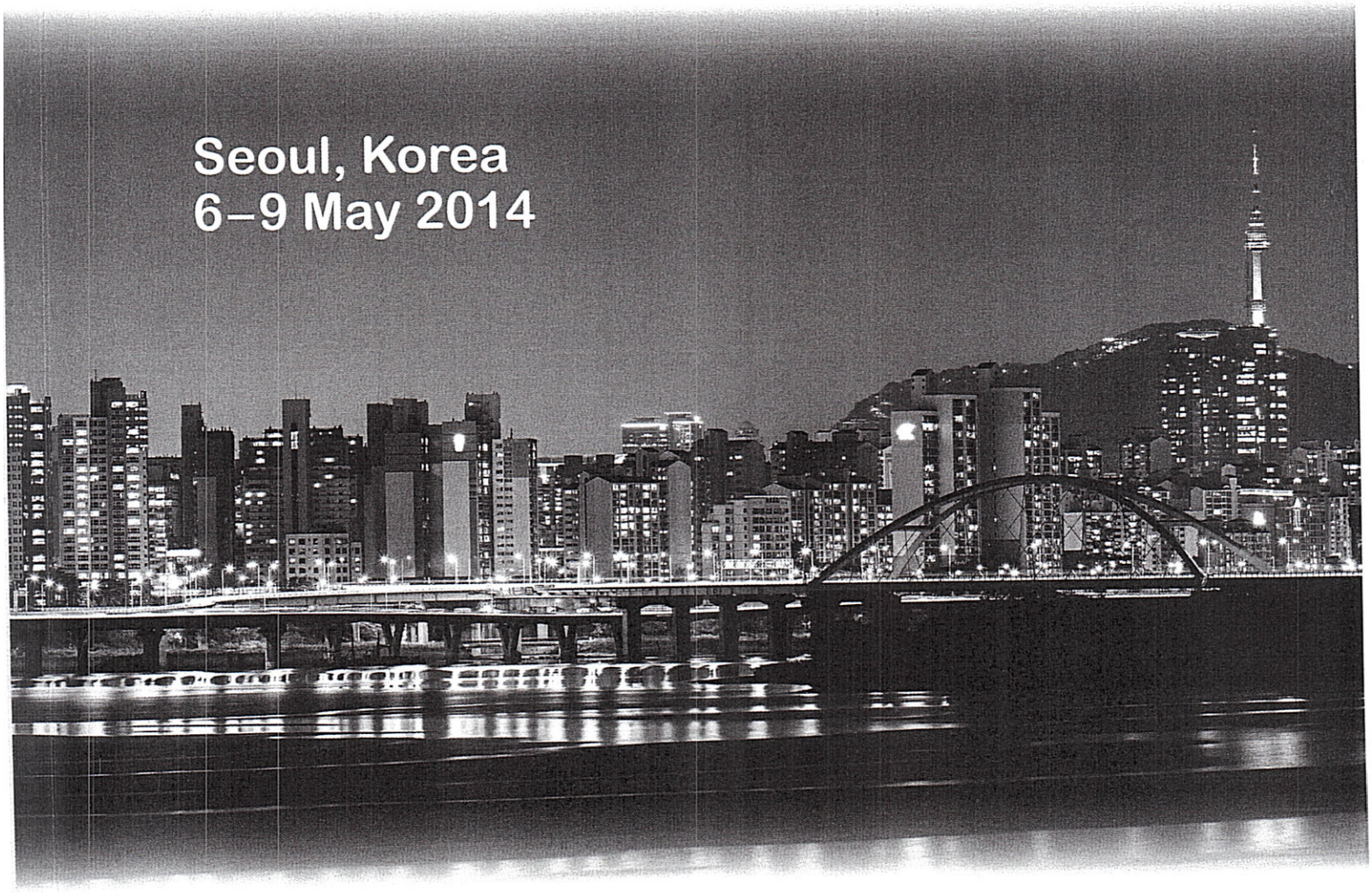
2014 Fifth International Conference on Information Science and Applications

ICISA 2014

Technically Co-Sponsored by IEEE Computer Society



Technically Co-Sponsored by

IEEE

IEEE computer society

Track 12: SATA Workshop

Model Transformation Rule for generating Database Schema

Chae Yun Seo
Dept. of Computer & Information Communication, Hongik University, Sejong Campus, 339-701
Korea
chyun@selab.hongik.ac.kr

R. Young Chul Kim
Dept. of Computer & Information Communication, Hongik University, Sejong Campus, 339-701
Korea
bob@selab.hongik.ac.kr

Young B. PARK
Dept. of Computer Science, Dankook University, 330-714
Korea
ybpark@dankook.ac.kr

Abstract— **The previous researches had developed business process frameworks for easily integrating the separating data processing and managing, and decision-support systems built by different times in different places, but never mentioned how to develop this complex business process structures, that is, six-layer architecture. This paper suggests how automatically to develop a whole database schema of business process framework. To do this, we apply with Model-To-Text transformation based on metamodel to automatically build the schema based business process model. This procedure is follows: 1) defining each meta-model of the entire structure and of database schema, and 2) also defining model transformation rules for it. With of model transformation rules of this procedure, we can automatically transform through meta-modeling of an integrated information system to the schema based model information table specification defined of the entire layer.**

Keywords—Model Driven Architectur (MDA); UML; Metamodel; Model Transformation; Business Process Framework (BPF); Query Language; BPSQL; Model-To-Text Transformation Language

I. INTRODUCTION

An enterprise needs to provide with a business-integrated system framework to quickly change and adapt new business. It is to use the framework possible to easily integrate the system by different teams at different time in different places [1]. Most enterprises have a computer system to efficiently operate systematic information, and also to appropriately preserve/manage it, which consists of closed layer architecture [2]. The closed architecture is based on the layer mechanism, and directly access right under the layer. Seo and Kim[3] suggested and defined five layer structure based on the closed architecture. Seo[1] also suggested to reuse the existing software component for reducing development time and cost with mapping CBD(component based development) and BPM(Business process modeling)[2]. On the previous proposed business process framework based on closed architecture, we defined BPSQL(Business Process Structured Query Language)[6], and showed to retrieve and access information between each layer with the simple associated query statements. In this moment, we need to store each data, but manually develop the structure of each layer on BPF until now. With this database schema, we can create a whole business process framework. Therefore, we suggest how to generate the schema-based business process model with the complex business process framework based on a closed architecture. To do this, we study automatically to generate database schema with BPF modeling information, which 1) defines metamodel of the whole structure for Business process framework, 2) models our own target business based on the metamodel, 3) and also needs M2T (model-to text)transformation rules for automatic BPF schema creation. In this time, it is limited that this research represents Business process framework with just XMI data without UI and visualization

This paper describes as follows: chapter 2 mentions related work, chapter 3 describes how to design BPF with a metamodel chapter 4 describes transformation rule with ACCELEO and shows M2T transformation rules for creating automatic BPF schema, and conclusion.

II. THEORY

A. M2T(Model To Text Transformation Language)

MOF Model to Text Transformation Language(Mof2Text or MOFM2T) is an Object Management Group(OMG) specification for a model transformation language. Specifically, it can be used to express transformations that transform a model into text (M2T), for example a platform-specific model into source code or documentation. MOFM2T is one part of OMG's Model-driven architecture (MDA) and reuses many concepts of MOF, OMG's metamodeling architecture. Whereas

978-1-4799-4441-5/14/$31.00 ©2014 IEEE

MOFM2T is used for expressing M2T transformations, OMG's QVT is used for expressing M2M transformations [5].

1) Acceleo

Acceleo is an open-source code generator from the Eclipse Foundation that allows people to use a model-driven approach to building applications. It is an implementation of the "MOFM2T" standard, from the Object Management Group (OMG), for performing model-to-text transformation [4].

III. Business Process Framework Metamodel

The A BPF is comprised of five layers: business rules, business processes, services, components, and data modeling. A repository like DB tablization is present at each layer [1]. A BPF is a closed architecture where each layer is directly connected to the next layer.

The layered structure can quickly produce new services by reusing existing components when business demands exist. New businesses can be configured with this service. The repository at each layer is tabulated, and a layer generates data query using BPSQL [2]. Finally, the required data are extracted.

A BPF metamodel defines the essential elements, grammar, and structure of UML metamodel which creates the business process framework model. For model transformation, Source Metamodel is designed based on BPF Metamodel. Figure 1 is the Business Process Framework Metamodel. It is a detailed description of the BPF metamodel as follows.

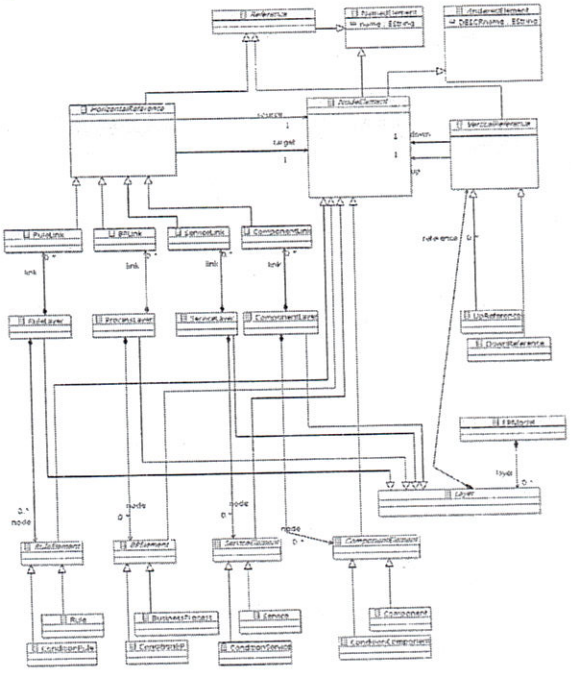


Fig. 1. Business Process Framework Metamodel

Transformation model, the appropriate Source Model produces the XMI data. Table1 is the XML data of the BPF metamodeling about Rule Layer, Process Layer, Service Layer, and Component Layer.

XMI elements "<layer xsi:type="bpmetamodel:_ Layer">" in each layer are separated. The DownReference is associated with the sub-layer, the UpReference is connected with the upper layer. <link> is connected within the equivalent layer, the source and target is distinguished as input and output respectively. <node> is the name of each layer, which describes the role of <node>.

IV. Transformation Rule with Acceleo

We transformed the XML data (which is obtained from the result value of Modeling) into SQL schema with a conversion tool, and use transformation rule with the Acceleo. Figure 2 shows Transformation rule with Acceleo. We store SQL transformation with each model by the elements in XMI data.

```
[comment encoding = UTF-8 /]
[module generate('http://www.eclipse.org/emf/2002/Ecore')]
[template public generateElement(aEPkage : EPackage)]
[comment @main/]
[file (aEPkage.name.concat('.sql'), false, 'UTF-8')]
[for ( eClassFier : EClassifier | aEPkage.eClassifiers)]
[if (eClassFier.eClass().name = 'EClass')]
[if ( eClassFier.oclAsType(EClass).name = 'RuleLayer' or
eClassFier.oclAsType(EClass).name = 'ProcessLayer' or
……)]
create table [eClassFier.oclAsType(EClass).name /]
(
[comment Attribute /]
[if (eClassFier.oclAsType(EClass).eStructuralFeatures->select(e |
e.name='node')->first().eType.eClass().name = 'EClass')]
[generateAttribute( eClassFier.oclAsType(EClass).eStructuralFeatures-
>select(e | e.name='node')->first().eType.oclAsType(EClass) ) /]
[/if]
[comment link /]
[if(eClassFier.oclAsType(EClass).eStructuralFeatures->select(e |
e.name='link')->first()->size() = 1) ]
,[eClassFier.oclAsType(EClass).eStructuralFeatures->select(e |
e.name='link')->first().name /] varchar(100) NULL
[/if]
[comment Layer /]
[for ( eLayerClass : EClass | eClassFier.oclAsType(EClass).eSuperTypes)
]
[for (eFeature:EStructuralFeature | eLayerClass.eStructuralFeatures) ]
[if (eFeature.eClass().name = 'EReference')]
[for ( vClass : EClass | eFeature.eType.siblings().oclAsType(EClass) ) ]
[if (vClass.eSuperTypes->first().name = 'VerticalReference')]
,[vClass.name /] varchar(100) NULL
[/if] [/for] [/if] [/for] [/for]
)
[/if] [/if] [/for] [/file] [/template]
[template public generateAttribute(eClass : EClass)]
[if (eClass.eStructuralFeatures->size() = 0) ]
[for ( loopClass : EClass |
eClass.eSuperTypes)][generateAttribute(loopClass) /][/for]
[else]
[for (eFeature:EStructuralFeature | eClass.eStructuralFeatures) ]
[if (eFeature.eClass().name = 'EAttribute')]
[if (eFeature.name = 'name')]
[eFeature.name /] varchar(100) NOT NULL PRIMARY KEY
[else]
,[eFeature.name /] varchar(100) NULL
[/if] [/if] [/for] [/if] [/template]
```

Fig. 2. Transformation Rule with Acceleo

This approach automatically generates SQL schema structure with the modeled BPF structure is generated. All layer information is automatically stored in schema structure.

978-1-4799-4441-5/14/$31.00 ©2014 IEEE

V. CONCLUSION

Our previous approaches do not focus on how to automatically develop the whole Business process framework. In this paper, nobody we suggest ModelToText transformation based on metamodel to automatically build the schema based business process model. This procedure is follows: 1) defining each meta-model of the entire structure and of database schema, and 2)also defining model transformation rules for it. With of model transformation rules of this procedure, we can automatically transform through meta-modeling of an integrated information system to the schema based model information table specification defined of the entire layer. Therefore, we can easily and automatically build the whole DB schematic with Model transformation technique.

ACKNOWLEDGMENT

This work was supported by the IT R&D Program of MKE/KEIT [10035708, "The Development of CPS(Cyber-Physical Systems) Core Technologies for High Confidential Autonomic Control Software"] and Basic Science Research Program through the National Research Foundation of Korea(NRF) funded by the Ministry of Education (2013R1A1A2011601)

REFERENCES

[1] Chae-Yun Seo, R. Young Chul Kim, "Automatic 5 Model construction of Business Process Framework(BPF) with M2T Transformation",IWIT,(2013)

[2] Chae Yun Seo, Robert Young Chul Kim, "Query Language for Business Process Framework based on Closed Architecture", ITCS2012ASTL13,(2012)

[3] Chae Yun Seo, Dong Woo Kim, R. Young Chul Kim, "Business Process Framework based on the Closed Architecture", Journal of the Korea Academia-Industrial cooperation Society, Vol. 10, No. 8, 1939-1946 (2009)

[4] Eclipse Acceleo, http://eclipse.org/Acceleo/

[5] OMG, "MOF Model to Text Transformation Language, v10.1 (2008)

[6] Chae Yun Seo, So Young Moon, R. Young Chul Kim, "A Study on Data Migration for BPSQL Query Language on Business Process Framwork(BPF)", KIISE, (2011)

ICITCS2014

http://icitcs2014.org/

ICITCS 5th will be held in Beijing, China from October 27th-29th, 2014. This will also include joint conferences from ICISST, ICMWT and ICIEEM. Beijing is a city of great majestic history and has endless activities for anyone to enjoy. We are excited to invite you and your fellow scholars to come join us for a new experience.

ICISA2015

http://icisa2015.org/

Come join us for the 6th ICISA from January 5th-7th, 2015. ICISA2015 will be held in Las Vegas, USA the City of Lights. Las Vegas has everything from amazing views, performances, food and everything for the family. ICISA will have scholars from all over the world and will be the perfect time to come and participate in the conference.

ICISA 2014

Technically Co-Sponsored by IEEE Computer Society

Technically Co-Sponsored by

IEEE

IEEE computer society