Advanced Science and Technology Letters
Vol.111 (NGCIT 2015), pp.19-22
http://dx.doi.org/10.14257/astl.2015.111.05

Tourism Enterprise Life Cycle Management Based on Ontology and Description Logic

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Abstract. For the tasks of different participants and requirements of resources information sharing needs of complex product project in the WBS decomposition process, as well as the problems of design, manufacture and the disconnect between tourism management information transfer, the thesis puts forward the formal method to the metadata by using ontology model and description logic. Through the interaction of formal metadata sharing of heterogeneous data through is realized. Taken large OKP enterprise as the object of study, firstly, the data model in material management are domain analyzed; providing effective carrier for the emerge of static data in the work breakdown process of complex product by constructing ontology, the thesis abstracts related concept class to construct domain ontology model. Then, carrying out the formalized description on material management domain ontology model combined with the description logic. Finally, combining typical complex manufacture of Marine product, carrying out the project modeling and decomposition from three levels, the concept, business domains, activity domain, reveal the relationship between task at all levels, suited to the characteristics of the complex product project WBS model is established. The experiment shows that the constructed ontology model can effectively solve the problem of enterprise heterogeneous data sharing. Model has a certain commonality and can be reused for other subject areas, providing an effective way for unambiguous sharing of the enterprise business information.

Keywords: Ontology, Description Logic, Formalize, Material Management, Work Breakdown, Situation Calculus, Metadata

1 Introduction

In the construction process of the enterprise data warehouse, beacause of the knowledge of the builders, experience, different emphasis on description, the enterprise face the heterogeneous data integration problem. Metadata described for the data in the data warehouse, data source and data application rules, it is an important part to build, manage, maintain and use a data warehouse system [1]. Using metadata to heterogeneous data abstraction and generalization is conducive to the integration of information resources and spread[2]. Manufacturing enterprises plays an important role in the economic development of China, researching the manufacturing enterprise management characteristics, analyze the information activities, and building information model, provides theoretical guidance for its

ISSN: 2287-1233 ASTL

informatization construction is of great significance[3]. However, most of the existing research focused on the geographic information system, digital library and medical systems, and other fields, few solutions for manufacturing enterprise business demand. Compared other means of manufacturing with BOM under large OKP batch manufacturing, process route norm table dynamic, complex, as a result, other manufacturing methods can be thought of as a special case of the large OKP batch manufacturing [4-5]. Manufacturing process of complex product project involving multiple disciplines, has the time to cover the entire product life cycle, emphasize the characteristic of collaboration in different location[5], need to rely on the work breakdown structure (WBS) and split complex project tasks into relatively simple task step by step, but the decomposition principle of work and the lack of decomposition methods lead to people accustomed to customizate project WBS for a typical complex product for a long time, then, to look for patterns, makes the research on the WBS should be engineered, and difficult to replicate success. Because many management problems emerge in the process of design, manufacture and the disconnect between management information transfer , at the same time, the lack of information description and rugged process flow lead to dependence on dispatching management directly, therefore, the areas of complex product project needs the integration of the WBS urgent which can support multiple perspectives management needs [5].

2 Ontology Construction based on Description Logic

The six group based on the object-oriented thought, using the ontology definition: Ontolog y= {C, AC, R, AR, H, X}

Table 1. The symbol definition used in ontology representation

symbol	Symbol Difinition	Symbol	Symbol Difinition
C	concepts set relating to Ontology	AC	attribute set based on the concepts
CI	Concept set instance	ACI	Property of concepts set's instance
R	related assemblage betwwen concepts	AR	related attribute assemblage
RI	relation instance	ARI	The attribute of relationship instance
H	Hierarchy relation of concept C	X	all kinds of constrians based on attribute

Description logic is a formal tool based on object, is the first order predicate logic which can determine temperament set, it can be used to represent knowledge [7]. In many formal methods of knowledge representation, the main reason for people to pay special attention to description logic is: strict semantic basis; Handling of conceptual knowledge, especially the concept of layered treatment is very effective; Provide effective reasoning mechanism, support service which can determine the reasoning

[8]. Next,make a briefly introduce to the concept which has been used in the process of metadata expression based on description logic:

1) the basic logic symbols. Description logic provides the basic logical primitive to represent complex concepts and relationships.

Table 2. Common logic symbol descripting logic

symbol	Symbol definition	symbol	Symbol definition
$C \wedge D$	Conjunctive concept	$C \vee D$	Disjunctive concept
P^-	inverse relationship	$\neg C$	Take the non- in the concept
$\equiv$	Logical equivalence	$\rightarrow$	Logical implication
$\exists R.C$	Limit existing	$\forall R.C$	Arbitrary restrictions
$\geq n\ R.C$	Minimum number of restrictions	$\leq n\ R.C$	Maximum number of restrictions
Subclass Of	Subclass	Instance Of	Class instance

Wherein, n represents natural Numbers.

1) Atomic and compound class. Classes can be divided into atomic and composite class, class of atoms that are not divided classes, as {C}; Compound class can be connected with the connector by the atomic classes throughing logic, such as: $M \equiv C \wedge D$ said composite class M compounded by atomic class C and D throughing " $\wedge$ ".

2) The attributes of a class. The attributes of a class represents the characteristics of the class, a class can have multiple attributes. Between the properties of the same class connected with " $\wedge$," belonging to a class, such as <{C},{C.a1 $\wedge$ C.a2}> said concept class C has attributes a1 and a2,if a concept class C compounded by atomic classes, the composite C atom class are automatically attribute to C.

3) Instance of a class and its properties.Concept class C's I instance is expressed as C (I), the instances of the class can be formulated <{C},{C.a1 $\wedge$ C.a2},{C(I1),C(I2)},{C(I1).a1 $\wedge$ C(I1).a2,C(I2).a1 $\wedge$ C(I2).a2}>,C(I1),C(I2) are concept class C instances of I1 and I2.

4) Relationship and their properties. In the problem domain, the relationship with r lowercase letters, such as {C D $\wedge$ r1.a1} said the relationship between concept class for class C and D for r1 with a1 attributes. Relationship is the embodiment of the relationships between objects, represents specific relation, the definition method is the same with the definition of object class instance.

5) The constraints and restrictions of attributes. Constraints including the domain and range of constraints, including domain constraint refers to the scope of the property, only effective to what kind of things; Range constraint refers to the scope of the property, which belongs to the instance of the class or what type of value, etc.

3 Conclusion

Through the fomal discription of metadata concept terms,terms attribute and the relationships between terms in the field of material management of enterprise

above,realize metadata formalization,build enterprise formal metadata database,and then through the formal metadata interaction to achieve heterogeneous data sharing. Building material management domain ontology model has certain universality,the further refinement of the material management field information system platform has certain reference value for design and implementation work. Building material management domain ontology model can be reused for the other main areas of the enterprise, providing an effective way for unambiguous enterprise business information sharing,and increase the utilization level of enterprise information management system.

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