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A Study on Requirement Extraction on Use Case Approach

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Abstract. The previously proposed goal oriented requirement process has many problems to increase requirement analysis, and to order goal importance of the requirements when the number of requirements increases. In this paper, in order to solve these problems, we propose the requirements extraction process on Use Case approach, and also improve this approach with the Use Case Point proposed by G. Karner. As a result, our proposed process can extract requirements which require a number of requirements analyses. As a case study, we apply our proposal to the car products management system.

Keywords: Goal Oriented Requirement Process, Use Case Point, Requirement Analysis, and Requirement Engineering

1 Introduction

Previous Value-Innovative Requirements Engineering (ViRE) is a method to confirm, analyze and verify customer's value for developing value-innovative requirements [1,2]. However, since this method is based on the previous structural methodology, it is very difficult to apply this method to the object-oriented paradigm which is widely used currently [4]. Therefore, we propose a Goal-Oriented Requirements Engineering (GoRE) by combining the goal-based Use Case method of Cockburn [3,4,5].

The previous proposed goal-based requirement process is a method which applied only a part of the value-innovative requirement engineering, performing priority of the requirements and extracting the accurate requirements. However, there are three problems when applying such many requirements. First of all, there are many conditions to be considered for relations analysis and goal importance matrix analysis. Secondly, the goal importance calculation operations of Use Case and requirements increase since the number of relations between Use Cases and requirements increase, and degree of relations between them should be analyzed one by one. Thirdly, since duplicated requirements are found by measuring the degree of the importance of the requirement goal, organizing process of requirements increase as the duplicate requirements increase.

In this paper, in order to solve these problems, the Use Case Point which has been developed by Gustav Karner, will be applied [6,7]. The Use Case Point uses the Use Case which is one of the development methodologies in the object-oriented paradigm,

and it can be applied to the improved value-innovative requirements engineering. Moreover, by calculating the Use Cases and extracting priority, requirements can be extracted as the Use Case unit. This can solve the problem of increasing number of requirements.

This paper is organized as follows: In chapter 2, the goal-based requirements matrix processes which have been proposed previously are introduced as related study. In chapter 3, our goal-based requirements process is proposed, and in chapter 4, a case study is described. Finally, in chapter 5 conclusion and future work will be described.

2 Related Work

The Goal Oriented Requirements Process has been proposed to extract more accurate requirements by measuring requirements [3]. This has been applied to the goal-based Use Case methodology proposed by Cockburn to solve problems of the value-innovative requirements engineering. In the first customer requirements extraction step, Use Cases are created and the Goal oriented Use Cases are identified. According to the Goal Use Cases, the requirements are extracted and categorized by the Use Cases. In the second step, each requirement is evaluated through consultation with a customer and assigned its weight value in terms of Goal importance. In the fourth relations analysis step, relations between each Use Case and requirement are analyzed. Based on the degree of relations, a weight value is assigned as 9, 3, or 1. In the goal importance matrix analysis, the Use Case and the goal importance of the requirements are measured. By comparing the goal importance of the Use Case, priority of the Use Cases is performed. At this time, the goal importance of the requirements can have duplicated values, the rest of the values excluding the largest value are compared with other goal importance of the requirements. Through these steps, priority of the overall requirements and the Use Cases can be found.

3 Goal Oriented Requirement Extraction Process

The Use Case point method proposed by G. Karner evaluates by measuring the number and size of the Use Cases quantitatively. However, in this paper, our proposal calculates each Use Case point. This is to find priority by calculating each Use Case point. Priority of the Use Cases is obtained by applying the Use Case point to the previous goal-based requirements process.

As shown in Figure 1, there are two parts largely in our proposed Goal Oriented Requirements Process based on the Use Case point. The Use Case requirement extraction process is the Goal Oriented Requirements Process which extracts the requirements by applying the goal-based Use Case method to the previous value-innovative requirements engineering method. This process has 5 steps in total. The steps for requirements extraction are as follows:

Step 1: Defining the Use Cases

Step 2: Drawing Use Case diagrams

- Step 3: Identifying the goals of the Use Cases
Step 4: Creating the goal-based Use Case specification
Step 5: Extracting requirements within each Use Case

Use Cases are defined by categorizing the collected requirements,. The Use Case diagrams are depicted by understanding system circumstance and identifying actors. At this time, responsibilities between actors are checked, and relations between the Use Cases are identified. The goal of each Use Case is identified and ordered. Using the Use Case definition method and the goal-based scenario proposed by Cockburn, the goal-oriented requirements are described. Through these steps, requirements within each Use Case are extracted.

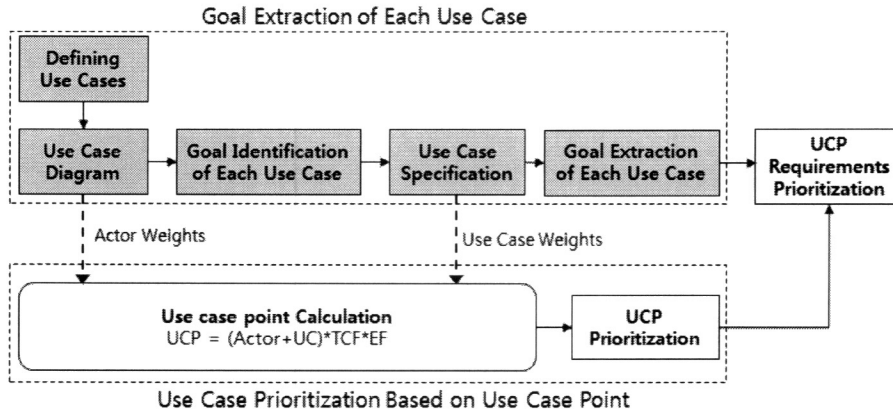


Fig. 1. Goal-oriented requirements process using the Use Case point

4 Case Study

Requirements are extracted by applying the process proposed in this paper to a car products management system. To develop the system, customer requirements are analyzed and ordered. In Table 1, customer's requirements are collected and ordered by Use Cases. Customer management, sales management, warehousing management, product management and expense management have functions of register, query, change and deletion respectively, and they are arranged in one table to be managed effectively. As particular requirements, income query, expense management (expense register/query/change/delete), and sales deletion can be accessed only by supervisor.

Using the customer's requirements and requirements by functions, Use Case diagrams are created. Considering the relations between actors (user, supervisor) and Use Case, these relations are applied to the Use Case diagrams. Figure 2 shows the Use Case diagram for the car products management system. In the car products management system, 22 Use Cases are extracted in total.

Table 1. Functional Requirements for Customers

Use Case	User	Function
Login	User Supervisor	<ul style="list-style-type: none"> • User register check • Login(ID, password check)
Customer management	User Supervisor	<ul style="list-style-type: none"> • Customer register / query / change / delete • Popup windows • Save • Default value display(on change) • Report printout
Sales management	User Supervisor	<ul style="list-style-type: none"> • Sales register / query / change / delete • Combo box selection • Sales search by date • Input of reason for change or delete • Popup windows • Sales deletion only accessed by supervisor
Warehousing management	User Supervisor	<ul style="list-style-type: none"> • Warehousing register / query / delete • Popup windows • Date Selection(calendar) • Date input(YYYY-MM-DD) • Default value display (on change)
Products management	User Supervisor	<ul style="list-style-type: none"> • Product register / query / delete • Save • Return to register page upon trying re-registering of registered product
Income Query	Supervisor	<ul style="list-style-type: none"> • Monthly income / expense / monthly revenue search • Date selection • Search by day/month/year • Investment amount register / query / change
Inventory management	User Supervisor	<ul style="list-style-type: none"> • Expense register / query / change / delete • Combo box selection • Report printout • Calendar selection • Popup windows • Default value display(on change)
Expense management	Supervisor	<ul style="list-style-type: none"> • User register check • User register check
Print	User Supervisor	<ul style="list-style-type: none"> • Printout

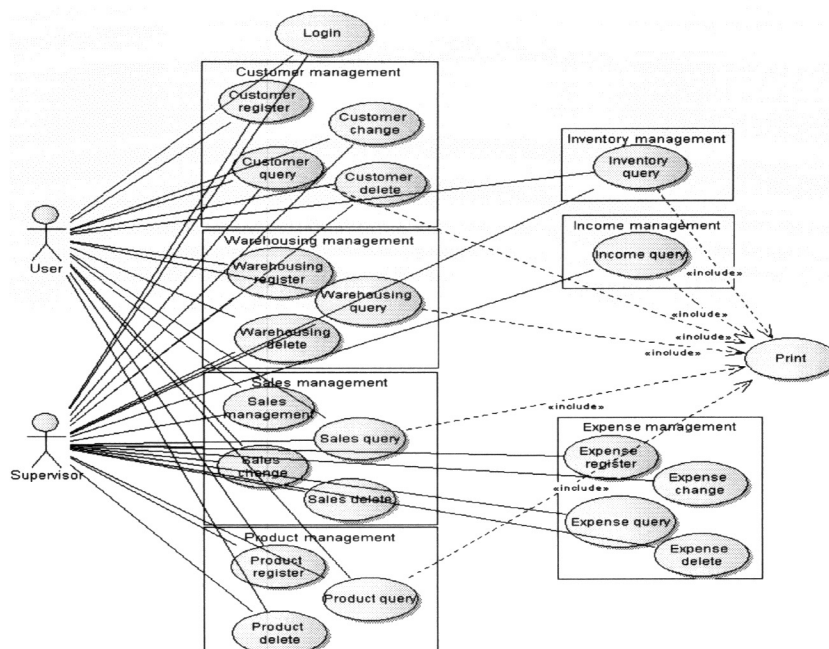


Fig.2. Use Case diagram for the car products management system

5 Conclusion

Previously proposed goal-oriented requirements process can extract accurate requirements by performing priority on requirements. However, it has problems to increase requirement analysis, and to perform and order goal importance of the requirements when the number of requirements. To solve this problem, it applies the Use Case point to improve.

In this paper, our proposed method of the requirement extraction process for each Use Case is to extract requirements by applying the goal-based Use Case method to the previous value-innovative requirements engineering. The extraction process has the following steps: defining requirements and Use Case, drawing Use Case diagrams, identifying Use Case goal, creating Use Case specification, extracting requirements by Use Cases. These steps have been applied to the car products management system to extract the requirements. As a result, 22 Use Cases were extracted in total from 9 customer requirements.

In future work, we will compare and evaluate two priority efficiencies between one extracted by the previously proposed goal-based Use Case method and the other extracted by the Use Case point.

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References

1. Sangsoo Kim, Hoh, Peter In, “VIRE: Sailing a Blue Ocean with Value-Innovative Requirements”. Software, IEEE, pp. 80-87, Vol. 25 (2008)
2. Sangsoo Kim, “Value-Innovative Requirements Engineering”. Dissertation for the Degree of Doctor, Department of Computer Science and Engineering Graduate School, Korea University (2007)
3. Bokyung Park, Soyoung Moon, Dongho Kim, Chaeyeon Seo, R. Youngchul Kim, “A Study on Extraction of Goal Oriented Use Case Based Requirements”. Proceedings of 2012 Korea Conference on Software Engineering (2012)
4. Bokyung Park, Soyoung Moon, Chaeyeon Seo, R. Youngchul Kim, “Extraction & Prioritization of Goal Oriented Use Case Based Requirements”. Proceedings of KISM Spring Conference 2012, vol. 1, no. 1, pp. 62-65 (2012)
5. Bokyung Park, R. Youngchul, Kim, “Extraction & Prioritization of User Preference Requirements through User Needs”. The 37th KIPS Spring Conference (2012)
6. Karner G.: Resource Estimation for Objectory Projects. Objective System SF AB(copyright owned by Rational Software) (1993)
7. Karl. E. Wiegers: More about Software Requirements. Thorny Issues and Practical Advice, MicrosoftPress (2006)