A Commonality & Variability Analysis Method for Process Tailoring

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Abstract. Software companies have a difficulty on applying a software process to varied software development domains. This paper suggested a commonality and variability analysis method for software process tailoring that can build software process that will be applied for certain software project by reusing software process asset constructed by software organizations. If software companies apply a software process tailoring with the proposed method in this paper, the software companies can have an effect on increasing the number of opportunities to reuse a software process and reducing the efforts to reapplying a software process.

Keywords: Software process, Process tailoring, Process reuse, Software product line, Commonality & variability

1 Introduction

As IT environment is being converged these days, applying scope of software is extending to non IT domain, and scales of IT project is going to be a large size. Under this software development environment, software companies are trying to develop a high-quality software by making a software process.

But software companies have a difficulty on applying a software process to varied software development domains. In the circumstances, a process designer tailors project-specific software processes for certain projects from an organizational software process model. Frequently, software process tailoring is performed in an informal and reactive fashion, which is expensive, unrepeatable and error prone [1].

Thus, this paper suggests a commonality and variability analysis method for software process tailoring that can build software process that will be applied for certain software project by reusing software process asset constructed by software organizations.

If software companies apply a software process tailoring with the proposed method in this paper, the software companies can have an effect on increasing the number of

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opportunities to reuse a software process and reducing the efforts to reapplying a software process.

The plan of this paper is as follows. Chapter 2 reviews backgrounds of the software process tailoring and the software product line and chapter 3 presents a commonality & variability analysis method for process tailoring. And finally, chapter 4 mentions the conclusion and the future direction for the study.

2 Related Researches

2.1 Software process tailoring

Software process tailoring is the act of adjusting the definitions and/or of particularizing the terms of a general process description to derive a new process applicable to an alternative (and probably less general) environment [2] and an approach for defining project-specific processes by adding, removing or modifying the activities and the required inputs/outputs of a base process model to develop high-quality system efficiently [3]. In addition, project-specific processes mean a collection of interrelated, concrete activities along the timeline of the project, which take into consideration the characteristics of the specific project [3].

Defining processes can improve the effectiveness of software development organizations [4]. Therefore, software process definitions are both useful for practitioners and reasonably economical to produce. By the way, there is no standard software process suitable for all development situations since appropriateness depends on various organizational, project and product characteristics.

And therefore, software process tailoring that defines a specific software process for each project is necessary. But software process tailoring for defining a specific process of each project consumes large amounts of time and costs. So, a software process tailoring needs to be built for reuse and adaptation. In this paper, we propose a process tailoring method for identifying variability of software process.

2.2 Software product line

The software product line is powerful tool for ensuring quality, economic efficiency, and manageability of families of software systems [5]. The software product line is a set of software-intensive systems sharing a common, managed set of features. All systems within this set are developed from a common set of core assets in a prescribed way [6]. Variability is an important concept related to the software product line development, which refers to points in the core assets where it is necessary to differentiate individual characteristics of products [7]. Therefore, it is important to identify features which are a system property that is relevant to some stakeholder and is used to capture commonalities and variabilities among products in a software product line.
In this paper, we bring in variability concept on the software product line to identify commonalities and variabilities among existing software processes for software process tailoring.

3 A commonality & variability analysis method for process tailoring

3.1 Selection of process area

This phase identifies the process activities that aim to generalize and identify the activities that must be performed to achieve the purpose of the process. The identifying of the activities refers to the process reference model associated with the selected process area to identify the activities.

Table 1. The form of activity list

<table>
<thead>
<tr>
<th>Process name</th>
<th>Process purpose</th>
<th>Reference model name</th>
<th>Activity list</th>
</tr>
</thead>
</table>

- Process name: describe a process name
- Process purpose: describe a process purpose
- Reference model name: describe name of reference models
- Activity list: draw up an activity list of a reference model

3.2 Generalization of activity definition

In this phase, the process designer compares the list of activities of process reference models derived from the previous phase for process area selection. One of the main reasons for doing this is that the process designer is to identify commonality and variability of activities between the reference models.
Table 2. The Form of Activity Comparison

<table>
<thead>
<tr>
<th>Reference model name</th>
<th>C&amp;V</th>
<th>The number of activity division</th>
<th>The result of C&amp;V</th>
<th>General activity name</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&amp;V</td>
<td>Activity name</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The number of activity division</td>
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<tr>
<td>The result of C&amp;V</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>General activity name</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Reference model name: describe name of reference models to compare them with each other in row and column
- Activity name: describe activities of reference models in row and column
- C&V: describe the result of commonality or variability about activities of reference models in row and column
- The number of activity division: describe the number of activity division about the relationship between activities of a reference model in row and activities of a reference model in column
- The result of C&V: describe the result of identified commonality or variability through activity division
- General activity name: describe name of general activity obtained through generalizing activities between the reference model in row and column

3.3 Selection of activity features

To generalize activity definition is repeated until there are no more reference models to compare. If there is no more reference model to compare, the process designer determines the list of general activity candidates derived from using table 2 as activity features in tabular form as shown in the table 3.

Table 3. The form of activity feature list

<table>
<thead>
<tr>
<th>Process name</th>
<th>Process purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commonality / Variability</td>
<td>Activity feature list</td>
</tr>
</tbody>
</table>

- Process name: describe a general process name
- Process purpose: describe a general process name purpose
Commonality / Variability: describe ‘M’ (mandatory) or ‘O’ (optional) according to the result of activity generalized

Activity feature list: draw up an activity features

Work Product: describe the work product name produced after performing the activity

Role: describe the role name responsible about performing the activity

4 Conclusions

In this thesis, we suggested a commonality and variability analysis method for software process tailoring that can build software process that will be applied for certain software project by reusing soft-ware process asset constructed by software organizations. If software companies apply a software process tailoring with the proposed method in this paper, the software companies can have an effect on increasing the number of opportunities to reuse a software process and reducing the efforts to reapplying a software process. In the near future, we will need to apply a proposed method to software domains and improve a proposed method through case studies.

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