

# Development of SPL Government System with Ontology Web Language

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**Abstract**— System Development in government institution are for improvement of business processes that can help to make a good governance. The software features of commonality and variability might be achieved from business processes. It can related with cost and time that allocated for system development. In order to this condition, we develop software product line which is called SPL. Beside that, we use GORE to improve quality of SPL. We use OWL feature for checking of goal model in SPL. We proposed SPLGS framework for develop SPL Indonesian Government System. SPL Indonesian Government System would be derived from goal model and feature model alignment.

**Keywords**— : **Software Product Line (SPL), OWL, E-Government, Feature Model**

## I. INTRODUCTION

The Process for gathering and identifying user needs, goal of system, and documenting in a template or form called requirement engineering[1]. There are two approach, such as traditional approach and goal oriented approach. Goal approach has a characteristics for having goal orientation in actor. It is used for development of software that has much complexity. There are 5 views according to [1][2], and also has five types of consistency [2]. Meanwhile, the problem for handling conflict in goal are new challenge in research area [3][4]. The major possibility conflicts are in goal model. However, it will possibility reach in the operational model. It makes causes there are open problem for handle conflicts in goal model [3,5].

We used Ontology Web Language (OWL) to get the pattern and knowledge for the exploration the domain area that has similarity [6]. It can explain the conceptual thinking and also the correlation and collaboration .The advantage from SPL are for reduce cost and optimization reuse for managed features commonality and variability [7]. SPL are related with software reuse and software mass production.

## II. LITERATURE FOUNDATION

### A. Goal Model

Goal and belief is a condition definition, while goal is a position or condition state at accident in the world which is the stakeholders are able to reach it. Beside that, there are association relationship between agent and belief. Therefore, the meaning and paradigm of agent has concern in own state and its working work [5][6]. We should defined the constraint to accommodate the limitation of the gain on a goal [5][6]. There are two level and has different concern of the classification. The focus of strategic are called high, and the focus of technical are called low.

### B. Ontology

Ontologies are the domain of knowledge for gather structure and knowledge in same domain [8].The standard language in ontology called ontology web language (OWL). The definition of something in the domain could be related with other something else. On the other hand, there are tools for develop OWL that called Protégé. OWL is built in RDF, which is XML for define many resources in the world wide web. The example are title, author, content and other information in the world wide web [9].RDF has a component that called URI that has responsible for resources identification.

### C. Software Product Line

SPL are the product which is developed from software product line engineering/SPL [7]. It is system development paradigm which is different with traditional system development [7]. It provide software reuse mechanism in order to accommodate features commonality and variability .It is an approach to develop a platform system from various different software . The advantage of SPL are for reduce cost and optimization reuse for managed features commonality and variability [7]. SPL can support and improve software of quality

### III. RESULT AND DISCUSSION

Figure 1 below described the local context of Indonesian government system. Indonesian government system has local government and central government policy. Central government has ministry and non ministry application. Local government has application in province, district, and agency. Both of central and local government policy should base on document regulations. The government document regulations describe the thematic, objectives and rules. The document consists of dependency and independent of rules. The document also consists of constraints among the level in the hierarchy government policies. There are M...N relation between theme, rules and objective. Then, based on theme and objective, it representation rules.

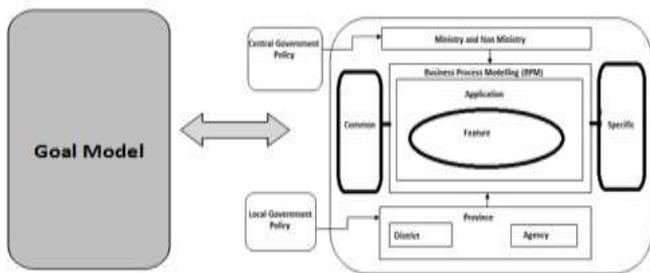


Figure 1. Goal Model and BPM Alignment

In order to achieve and improve of integration problem, we proposed software product line Government System that called SPLGS framework. We proposed SPLGS framework mechanism that described in figure 2 below :

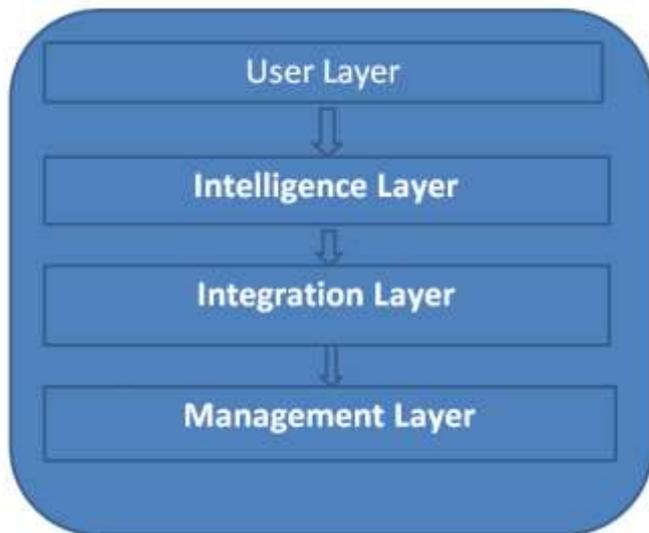


Figure2. Proposed SPLGS Framework

The figure 2 above shows the SPLGS Framework. This framework contains of user layer, intelligence layer, technical layer, and management layer.

The user layer is a layer which consists of database, business process and application. The Intelligence layer responsible for clustering the components based on government regulation .This layer can provides features that can be complementary as well as substitution for other features based on its environment. The integration layer is responsible for integration. It consists of orchestration and choreography mechanisms in SOA development.

Requirement Analysis has significant contribution for successfully system development. The contribution has percentage above of fifty percent, according to [12].This situation could be solved with develop of SPL. In provides variability mechanism and variability modeling. According to [13], variability means the capability to make robust and agility usages in various business processes. According to ontology web language research, such as mapping model to OWL [4], goal model research [15], OWL research [16], implement protégé [17][18].

A survey that according to [19][20] in e-government applications shows the fact of the condition in features commonality and variability. It described the clustering of block of application and function block in generic application and specific application. These applications are should be developed in government regulatory. Therefore, it makes probability of changes in application more often. This condition has difficult impact for manage system in the government area. It can makes the reusability are could not be done. This is unique environment, because there are inheritance software features between local government and central government. Beside that, there are much of naming software features wit the software features has similar functionality. It is problem of syntax and semantic knowledge area. The major impact of the change are the software features could not function as well as usual. The condition of software features commonality and variability happen are because the system developers have different methodology in system development. On the other hand, system developers have different solution and technologies for solving the problem and develop system in this government country. Therefore, system developers produced different software features when they design and develop based on user need and the regulations.

We proposed the SPL Indonesian Government System based on Goal Model to solve the problem. We acknowledge to Professor Zainal Hasibuan, Ph.D and Dr. Eko K Budiardjo for contribution that related in this work. The benefits of SPL are in the flexibility of system development in design, implementation, and maintenance.

It could be used as a platform for development of new system in domain of e-government. It can make a flexible environment in dynamic system, which is called adaptable. In order to achieve and improve quality of software product line Indonesian Government System, we proposed a conceptual mechanism that described in figure 3 below :



Figure 3. Software Product Line Indonesian Government System

Figure 3 above shows software product line Indonesian Government system are developed from goal model which is derived from government regulation .According from the block diagram in blue print of ministry of communication and information, It consists of Six SPL. There are SPL Budgeting, SPL Tax & Retribution ,SPL Human Capital, SPL Legislation, SPL Administration, and SPL Develop Planning.



Figure 4. Goal Model & Feature Model Alignment

Goal model and feature model alignment explain in figure 4 above. In this picture, consistency checking of goal model are needed in order to transform domain engineering to application engineering. Domain of this case are budgeting. We use gore methodology to analyze this domain. The results of domain analysis are goal model. However, we make the consistency checking to handle the conflict in goal model that we has achieved. In order to support transformation, we comply goal model and feature model alignment. It is critical process to provide platform of application in application engineering. The next section discuss and explain about the important of goal model which has no conflicts

The example of the case SPL Indonesian Government System are in budgeting domain. In this domain, we use application that called LAKSANA. We make an experiment from collecting and analyzing the document of regulations, make the goal model, make the business process model, make the feature model, aligning goal model with feature model, and handling consistency of goal model

#### IV. CONCLUSION

This work concern in system development ,which has specificity in requirement analysis cycle. The open problem in this work are the development of SPL that related with Goal Model in Indonesian Government. It is because, Indonesian Government has uniqueness characteristics. We proposed SPLGS framework for solve this problem. This framework contains of user layer,intelligence layer, technical layer, and management layer. The four layer has different functionality.

We suggest to aware in regulations before develop system. In order to produced software features for meet with the regulation, we proposed goal model. We used Goal Model to improve quality of SPL. Goal model are part of GORE, that has capability to handle conflicts. However, we need alignment goal model with feature model in order to achieve consistency.

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