

Module Changeability On Software Quality Measurement Of Municipal Government Inventory System

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Abstract

Inventoring have a function to report the budget realization in the municipal region. SIMSEDIA is an application that helps SKPD on Pekalongan city shall administer the inventory. The purpose of this study was to measure the quality of software SIMSEDIA to determine which features are likely to be developed. The measurement method referring to ISO 9126 models and object-oriented metrics. Measuring the quality specified in the aspect of changeability. The research method consists of: (1) Business Process Review, (2) Module Review, (3) Tools Selection, (4) Modul Measurement, and (5) Result. The results of this study will be a barometer of changeability of SIMSEDIA at the Municipal Government in the development of inventory system to be more optimal.

Keywords: *coupling, inventory, metrics, module, simsedia*

1. Introduction

Pekalongan City Government has 62 SKPD, each departments have different characteristics, such as the use of different types of inventory, and standard operating procedures of supplies can vary from one SKPD to another. SIMSEDIA used by 62 SKPD should be able to be modified and enhanced features to easily accommodate the different characteristics of each SKPD, government regulations, and the concept of development of Management Information Systems, namely flexibility, as the characteristic which demonstrates the ability of information systems to adapt itself to the changes occurred in the prior functionality may be an obstacle to generate a response to the satisfaction of user needs within an organization [Soriano, 2012]. Management information system that's flexible enough to handle changes to the information needs of the organization known as an open system that interacts continuously with the business environment with a unified mechanism to provide the desired information from any new requirements on management.

2. Research Methods

2.1 Business Process Review

[Pamudi, 2010] stated that the business process is a mixture between sub processes are mutually coordinated with one another to achieve a predetermined goal. Business Process talk

about how the work is done from a series of component inputs into outputs. Review business processes in SIMSEDIA include business process modeling outline of SIMSEDIA, including use case and activity diagrams modeling.

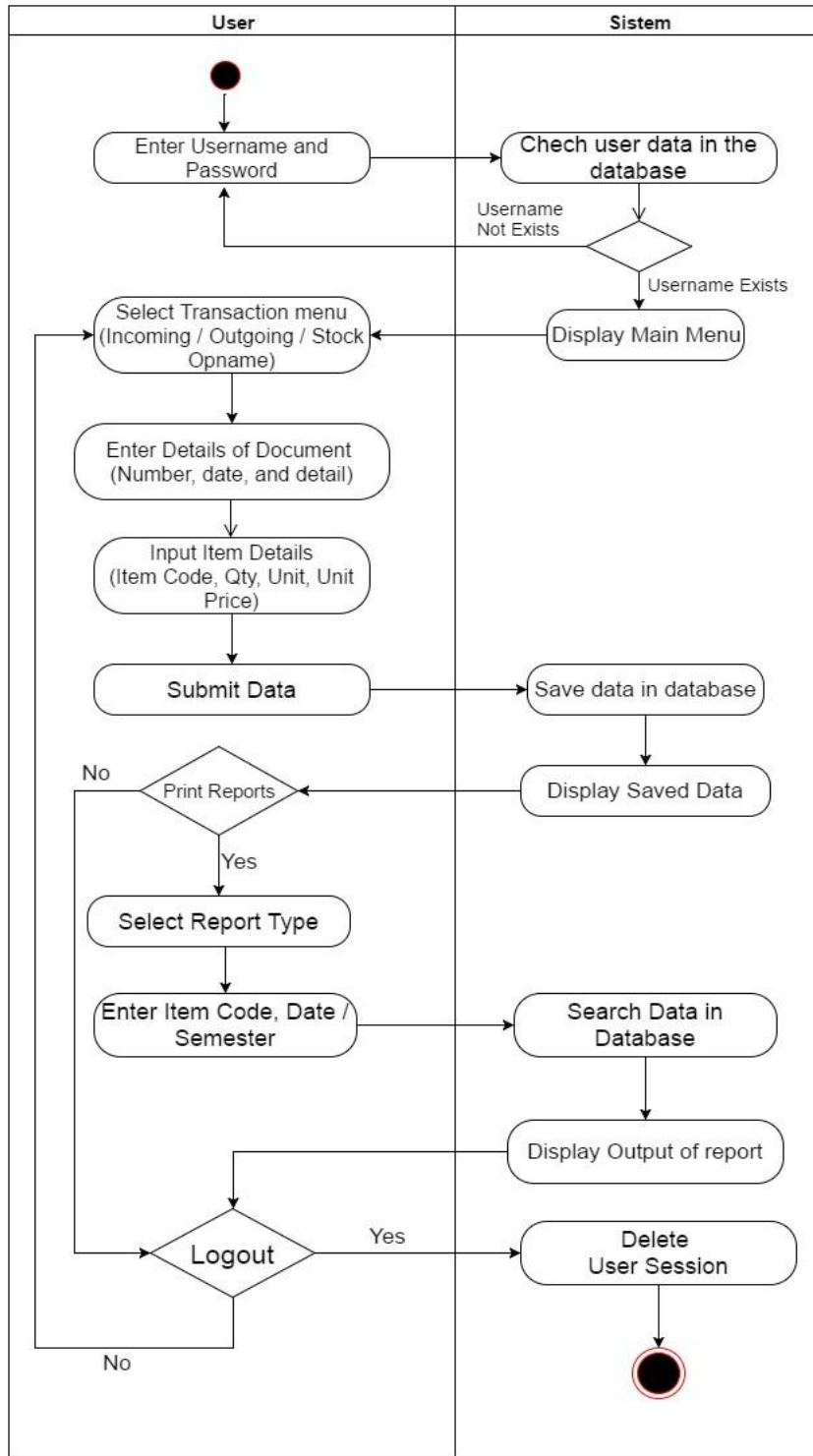


Figure 1. Business Process in SIMSEDIA

2.2 Module Review

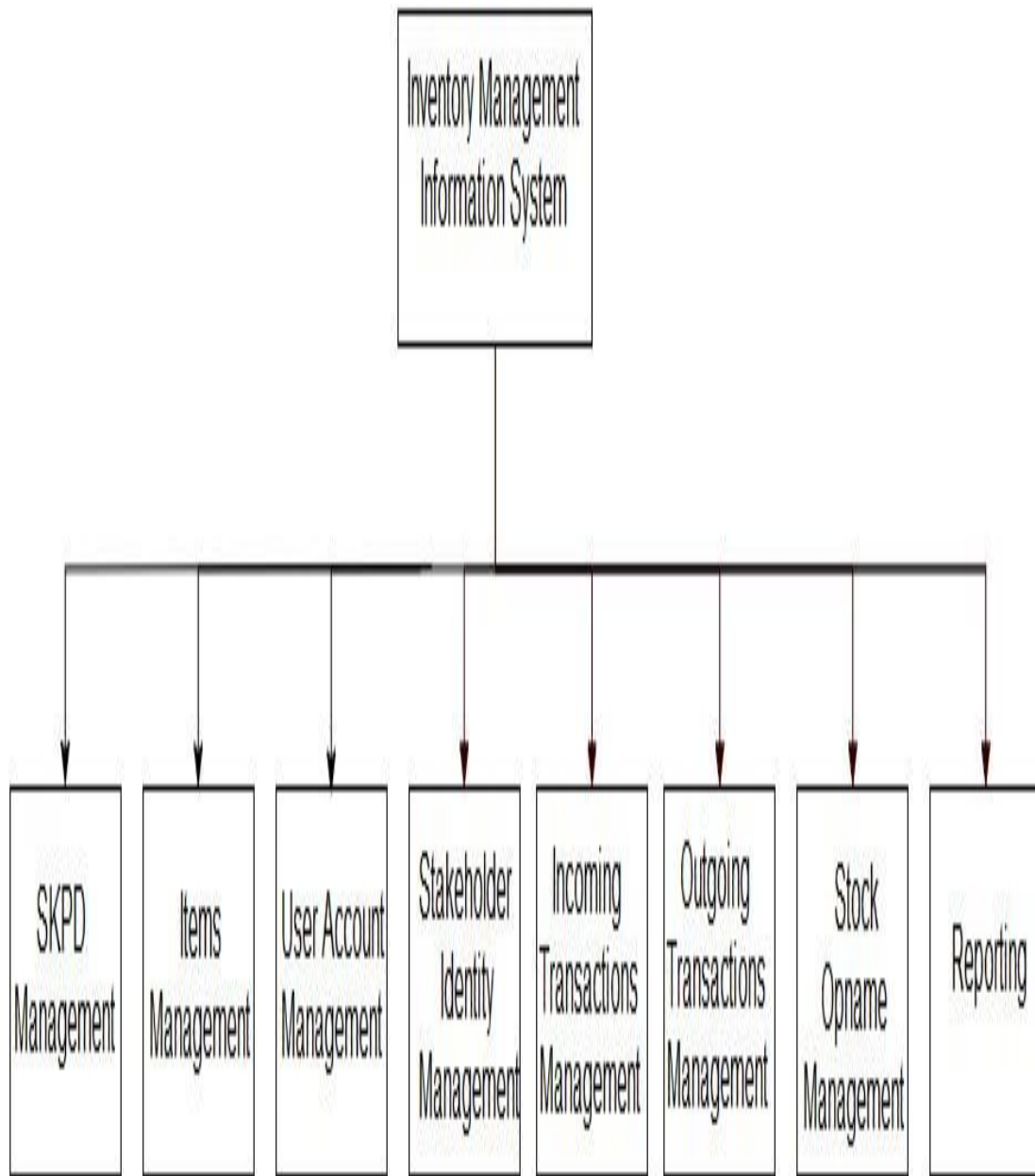


Figure 2. SIMSEDIA Modules

At this stage, review modules are done on SIMSEDIA. The module is a relatively independent group known in the statement related programs and can be viewed as a unit [Zulkifli Amsyah 2005]. Modules at SIMSEDIA shown in the figure 1 below.

2.3 Tools Selection

At this stage, the election of the tools used to measure the modules that have been separated before. Tools that have had to meet several criteria, including:

- Supports measurement with object oriented metrics.
- Support PHP language

- Be able to calculate parameters according to Chidamber & Kemerer metrics

Tools that support these criteria is PhpDepend, where small programs that perform static code analysis on a specific source code. Static code analysis shows that PhpDepend the first time will take the source code and parse the source code into an internal data structure that can be easily processed.

2.4 Module Measurement

Measurements on each module using object oriented design metrics, which refers to the model of Chidamber and Kemerer and Martin. The parameters used for the measurement is a parameter that reflects the changeability aspects proposed by [Ayalew and Mguni, 2013]. The list of parameters used in the measurement will be outlined in table 1.

Table 1: Measurement Parameter

Parameter	Description	Category
Afferent Coupling (Ca)	The number of classes that depend on a specific class.[Arapidis, 2012]	Coupling
Efferent Coupling (Ce)	The number of classes in which a class depends on the specific class.[Arapidis, 2012]	Coupling
Coupling Between Objects (CBO)	The amount of a class that is paired with another class that occurs through method calls, access variables, inheritance, arguments, return type and exceptions. (Chidamber & Kemerer, 1994)	Coupling
Weight Method per Class (WMC)	Number complexity of a method declared in a class (Chidamber & Kemerer, 1994)	Complexity

3. Result And Analysis

Pseudocode are implemented in the source code contained in the attachment list. Source code is measured using PHPDepend and generate value of results. Measurement Results of afferent coupling using PHPDepend tools are outlined in Table 2.

Table 2 : Result of Efferent Coupling Measurement

Class Type	Class Name	Value		Range		Criteria	
		Ca	Ce	Ca	Ce	Ca	Ce
Configuration	authenticate	0	3	$0 \leq 7$	$3 \leq 6$	Good	Good

Class Type	Class Name	Value		Range		Criteria	
		Ca	Ce	Ca	Ce	Ca	Ce
Configuration	config	1	0	$1 \leq 7$	$0 \leq 6$	Good	Good
Configuration	mysql_db	12	0	$7 < 12 < 39$	$0 \leq 6$	Reg.	Good
Model	ModelBarang	4	1	$4 \leq 7$	$1 \leq 6$	Good	Good
Model	ModelSektor	1	1	$1 \leq 7$	$1 \leq 6$	Good	Good
Model	ModeSatker	3	1	$3 \leq 7$	$1 \leq 6$	Good	Good
Model	ModelUnit	1	1	$1 \leq 7$	$1 \leq 6$	Good	Good
Model	ModelGudang	1	1	$1 \leq 7$	$4 \leq 6$	Good	Good
Model	ModelUser	1	1	$1 \leq 7$	$1 \leq 6$	Good	Good
Model	ModelTtd	1	1	$1 \leq 7$	$1 \leq 6$	Good	Good
Model	ModelTransaksi	1	4	$1 \leq 7$	$4 \leq 6$	Good	Good
Model	ModelOpsik	2	1	$2 \leq 7$	$1 \leq 6$	Good	Good
Model	ModelReport	1	4	$4 \leq 7$	$4 \leq 6$	Good	Good
Controller	prosesbarang	0	1	$0 \leq 7$	$1 \leq 6$	Good	Good
Controller	prosessektor	0	1	$0 \leq 7$	$1 \leq 6$	Good	Good
Controller	prosessatker	0	1	$0 \leq 7$	$1 \leq 6$	Good	Good
Controller	prosesunit	0	1	$0 \leq 7$	$1 \leq 6$	Good	Good
Controller	prosesgudang	0	1	$0 \leq 7$	$1 \leq 6$	Good	Good
Controller	prosesuser	0	1	$0 \leq 7$	$1 \leq 6$	Good	Good
Controller	prosesTtd	0	1	$0 \leq 7$	$1 \leq 6$	Good	Good
Controller	prosestransaksi	0	1	$0 \leq 7$	$1 \leq 6$	Good	Good
Controller	prosesopsik	0	1	$0 \leq 7$	$1 \leq 6$	Good	Good
Controller	prosesreport	0	1	$0 \leq 7$	$1 \leq 6$	Good	Good

Measurement Results of afferent coupling using PHPDepend tools are outlined in Table 3.

Table 3. Result of Efferent Coupling Measurement

Class Type	Class Name	Value		Range		Criteria	
		CBO	WMC	CBO	WMC	CBO	WMC
Configuration	authenticate	3	4	$3 \leq 6$	$4 \leq 11$	Good	Good
Configuration	config	0	3	$0 \leq 6$	$3 \leq 11$	Good	Good
Configuration	mysql_db	0	30	$0 \leq 6$	$11 < 30 < 34$	Good	Regular
Model	ModelBarang	1	22	$1 \leq 6$	$11 < 22 < 34$	Good	Regular
Model	ModelSektor	1	6	$1 \leq 6$	$6 \leq 11$	Good	Good
Model	ModeSatker	1	25	$1 \leq 6$	$11 < 25 < 34$	Good	Regular
Model	ModelUnit	1	8	$1 \leq 6$	$8 \leq 11$	Good	Good
Model	ModelGudang	1	15	$1 \leq 6$	$11 < 15 < 34$	Good	Regular
Model	ModelUser	1	13	$1 \leq 6$	$11 < 13 < 34$	Good	Regular
Model	ModelTtd	1	18	$1 \leq 6$	$11 < 18 < 34$	Good	Regular
Model	ModelTransaksi	4	101	$4 \leq 6$	$101 > 34$	Good	Bad
Model	ModelOpsik	1	28	$1 \leq 6$	$11 < 28 < 34$	Good	Regular
Model	ModelReport	4	214	$4 \leq 6$	$214 > 34$	Good	Bad
Controller	prosesbarang	1	14	$1 \leq 6$	$11 < 14 < 34$	Good	Regular
Controller	prosessektor	1	6	$1 \leq 6$	$6 \leq 11$	Good	Good
Controller	prosessatker	1	8	$1 \leq 6$	$8 \leq 11$	Good	Good
Controller	prosesunit	1	7	$1 \leq 6$	$7 \leq 11$	Good	Good
Controller	prosesgudang	1	10	$1 \leq 6$	$10 \leq 11$	Good	Good
Controller	prosesuser	1	7	$1 \leq 6$	$7 \leq 11$	Good	Good
Controller	prosesTtd	1	13	$1 \leq 6$	$11 < 13 < 34$	Good	Regular
Controller	prosestransaksi	1	31	$1 \leq 6$	$11 < 31 < 34$	Good	Regular
Controller	prosesopsik	1	10	$1 \leq 6$	$10 \leq 11$	Good	Good
Controller	prosesreport	1	20	$1 \leq 6$	$11 < 25 < 34$	Good	Regular

4. CONCLUSION

Measuring the quality of software SIMSEDIA on parameters that reflect aspects of changeability successful. Parameter measurements carried out on the model class consists of

10 classes, the controller class that consists of 10 classes, and configuration class that consist of 3 classes. The results using the tools PHPDepend for measuring parameters reflecting aspects of changeability in each class obtained value Afferent Coupling (Ca) high of 12 by class mysql_db, value Efferent Coupling (Ce) and Coupling Between Objects (CBO) is the highest of four by class ModelReport and ModelTransaksi, as well as the value Weighted Methods per Class (WMC) is the highest of 214 by ModelReport class.

References

- Ainapure, B. (2017). "Software Testing and Quality Assurance,". Technical Publication India
- Arapidic, C. (2012). "Sonar Code Quality Assurance,". Packt Publishing UK
- Ayalew, Y. and Mguni, K., "An assessment of cangeability of open source software," Computer and Information Science, vol 6, pages 68-79, 2013
- Bastian, I. (2006). "Akuntansi Sektor Publik : Suatu Pengantar,". Erlangga Jakarta
- BPS Statistics 2016 about Pekalongan Municipality in Figures
- Caroll, S. (2007). "Fundamental Concepts fot The Software Quality Engineer,". Packt Publishing UK
- Desikan, S. (2006). "Software Testing : Principles and Practice,". Dorling Kindersley India
- et. al., J. M. Z. (2011). "Software Engineering and Computer Systems". Springer Hidelberg Dordrecht New York
- Fito, T. G. S., Bigonha, M. A.S., and Ferreire, K. A. M., "A catalogue of thresholds for object-oriented software metrics," The First International Conference on Advances and Trends in Software Engineering, 2015
- Jawadekar, W. (2009). "Management Information Systems : Text & Cases,". Tata Mcgraw Hill
- Malhotra, J. J. and Tiple, B. S. (2008). "Software Testing and Quality Assurance ,". Nirali Prakashan Pune
- Olive, A. (2007). "Conceptual Modeling of Information Systems,". Springer-Verlag Berlin.
- Pamudi, T. S. (2010). "Riding the Wave: Strategi Andal Menaklukkan Industri Software,". Elex Media Computindo Jakarta.
- Pfleeger, S. L., Wu, F., and Lewis, R. (2005). "Software Cost Estimation and Sizing Methods: Issues, and Guidelines". Pittsburgh : RAND Corporation
- Rumbaugh, J., Jacobson, I., and Booch, G. (2005). The Unified Modeling Language Reference Manual. Second Edition. Pearson Education Inc
- Sharma, S., et, and al. "A review of coupling and cohesion metrics in object oriented environment" International Journal of Computer Science & Engineering Technology, volume 4, 2013
- Singh, Y. and Malhotra, R. (2012). "Object Oriented Software Engineering,". PHI Learning Private Limited New Delhi.
- Soemarso (2007). "Perpajakan : Pendekatan Komprehensif,". Salemba Empat Jakarta.

Soriano, J. L. (2012). *Maximizing Benefits from IT Project Management: From Requirements to Value Delivery*. Taylor & Francis Group.

U, P. and V., S. "Significance of coupling and cohesion on design quality," In *Significance of Coupling and Cohesion on Design Quality*, 2014