Modelling using unified software development process (USDP) method for repository system in Mulawarman University

IOP Conf. Series: Journal of Physics: Conf. Series **1277** (2019) 012027 doi:10.1088/1742-6596/1277/1/012027

Modelling using unified software development process (USDP) method for repository system in Mulawarman University

H R Hatta , D M Khairina, Haviluddin, A H Kridalaksana, S Maharani, Ramadiani and B Kresnapati

Faculty of Computer Science and Information Technology, Mulawarman University, Kampus Gunung Kelua, Samarinda, East Kalimantan, Indonesia

*Corresponding Author : heliza_rahmania@yahoo.com

Abstract. Lack of academic document storage or academic electronic-based data in Mulawarman University is the basis of this research. As a Republic Indonesia Regulation in No. 82/2012 on Electronic System and Transaction Act. 3. Therefore, Mulawarman University is required to provide electronic document or electronic-based data storage thus easy for those who need it. In this study, Unified Software Development Process (USDP) methodology as a modeling system has been implemented. Meanwhile, PHP and MySQL as a system development tool have been explored. A document storage system or website-based data called a repository information system has been created as a result of this research. Furthermore, this repository has ten types documents that can be stored and retrieved, consisting of journals, books, proceedings, articles, university regulatory, guidance, reports, course materials, letters, and other academic data for Mulawarman University.

1. Introduction

Currently, an electronic documents storage such as text, images, and video are required by organizations including universities. Thus, it is easier for those who need it. Therefore, access and searching data methods in the electronic documents is also applied. Furthermore, universities are educational institutions that have important documents such as judgments, regulations, scientific documents and others related. The difficulty of finding preceding documents is another reason why electronic storage needs to be created. Until now, there are many documents in hard-form. Therefore, the university electronic documents storage is the answer. Thus, storage and retrieval documents by remote access can be organized.

There are many development methodologies and tools in software engineering can be implemented in order to build system such as electronic storage. These methods as a framework that have structure, plan, and control the process of developing an information system, including for object-oriented software development such as Extreme Programming (XP), Dynamic Systems Development Method (DSDM) called light and dynamic methodologies. Then, Unified Software Development Process (USDP) called heavy-weight methodologies. Furthermore, all of them by using Unified Modelling Language (UML) in order to development process [1, 2]. Numerous researchers are using these methods in order to build information systems. [3] have been adapted UML process by using the “y” methodology as a learning methodology in the Institut National des Sciences Appliquées

de Toulouse (INSA) Toulouse, French. The study indicated that combination of "y" and UML to be good methodology in learning process, especially in two department GEI and CSH of INSA.

[4] have been implemented hybrid UML and i^* framework on the university environment system. The results showed that the hybrid methodology could be improved the conceptual schema quality of the models. Then, [1] have been adopted the UML concept in order to developed model in IT adoption framework and organizational culture theory with seven broad categories (i.e., IT characteristics, organization technology, environment, organization structure, organization process, organization culture, and project culture) at 251 North American organizations with five different industries. The research indicated that the UML concept was proposed the IT framework.

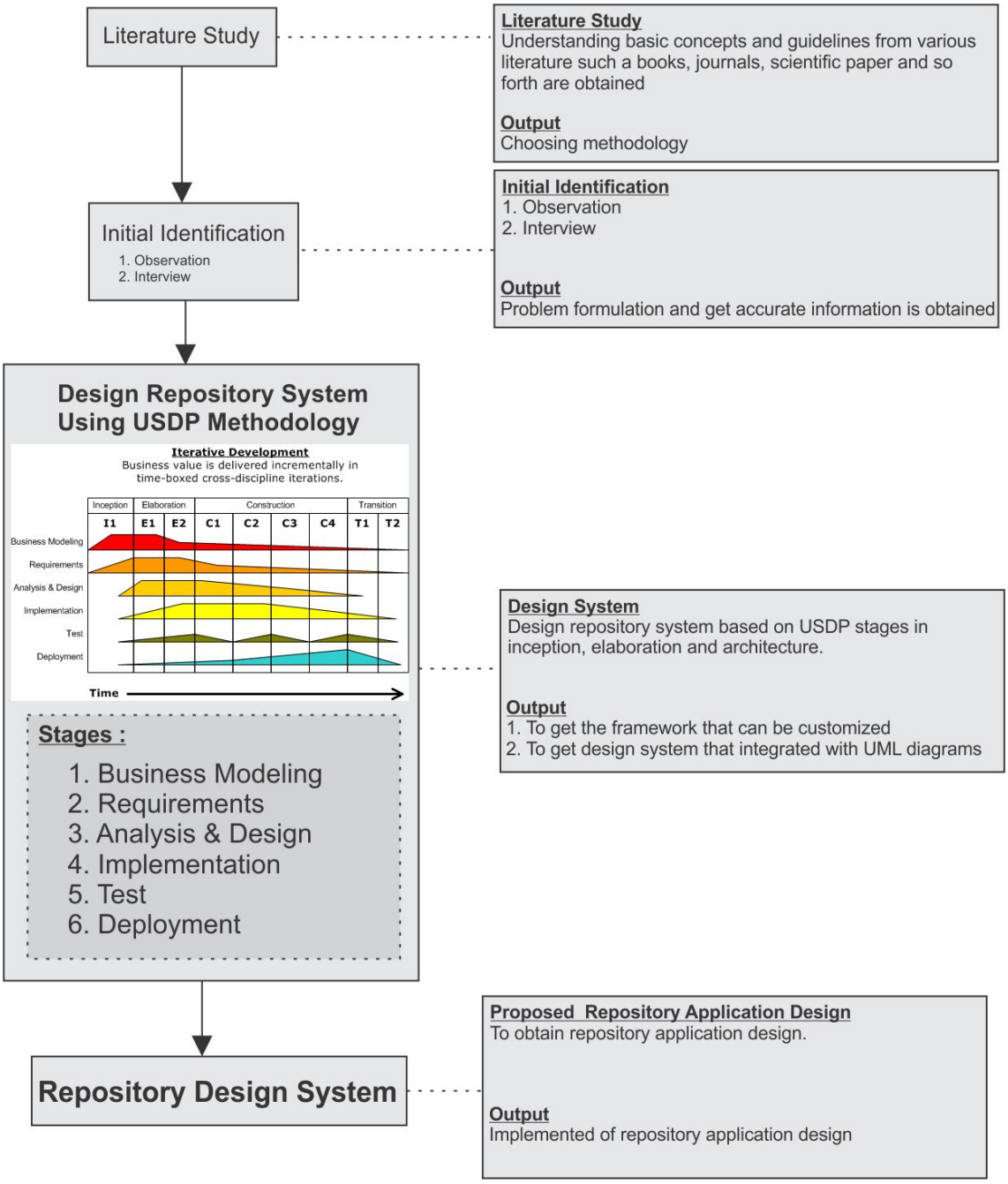

Figure 1. Repository development stages

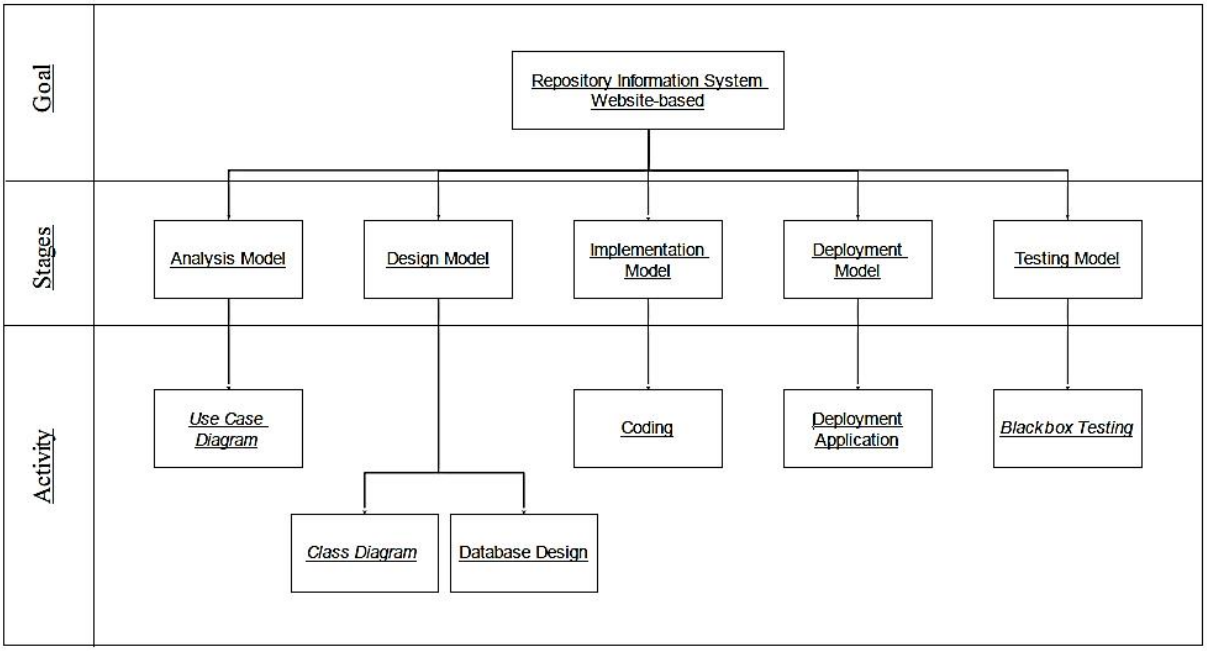

Figure 2. Repository Development Stages

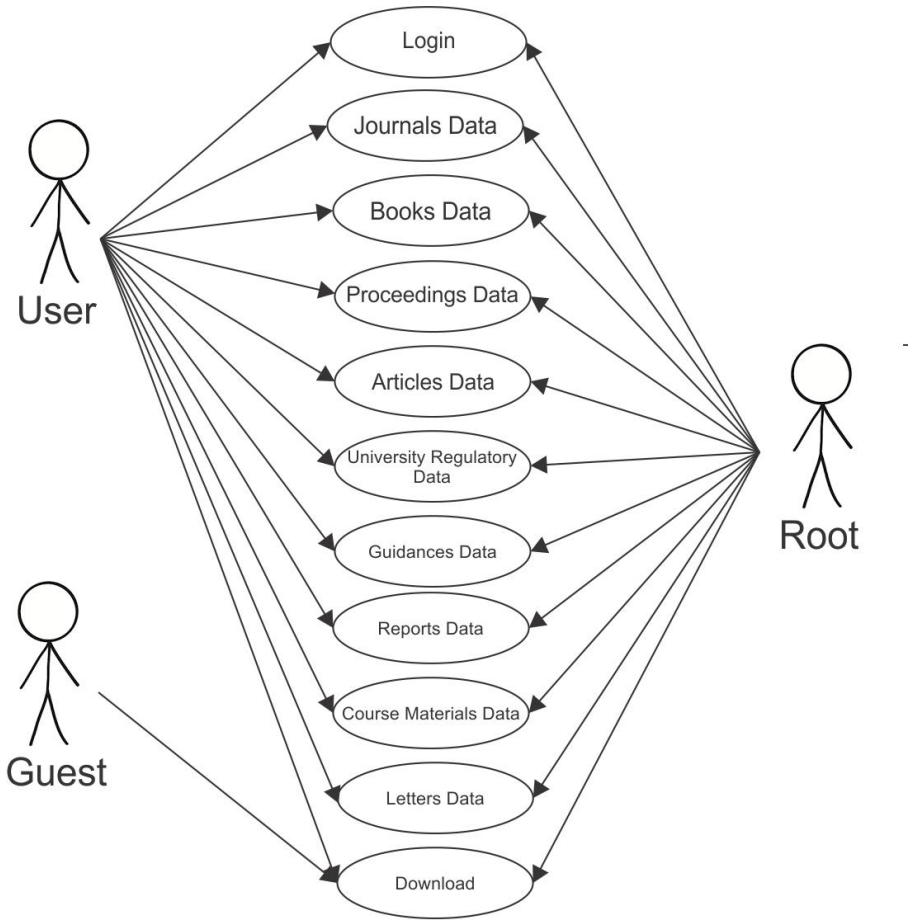

Figure 3. Repository Use case diagram

Furthermore, the objectives of this paper are to expose the USDP and UML to develop a repository information system as a storage of academic documents such as articles, report, course material, and other documents. Then, final product is to present the implementation of the USDP and UML in the repository information system as a software web-based by using PHP and MySQL language programming. The present article will be divided into four sections, including this introduction. Section 2 will introduce the USDP and UML concepts. Section 3 will present the implementation and discussion of USDP and UML. Section 4 will close the article by summaries of article.

2. Research Methodology

This section discusses the features of USDP and UML, for develop repository information system.

2.1. Unified Software Development Process (USDP)

USDP is a use-case based, architecture centric, iterative and incremental development process which was first introduced by Rational Team. In general, USDP have four main phases includes inception, elaboration, construction and transition. Furthermore, during each phase various iterations are implemented as a prototype. Then, each of phase includes six principle work processes such as specification of business modeling, requirements, analysis & design, implementation, testing, and Deployment [5, 6, 7, 8], Figure 1. In this study, USDP method for the repository system development consisting of five stages, (1) Analysis, (2) Design, (3) Implementation, (4) Deployment, and (5) Test Models, Figure 1.

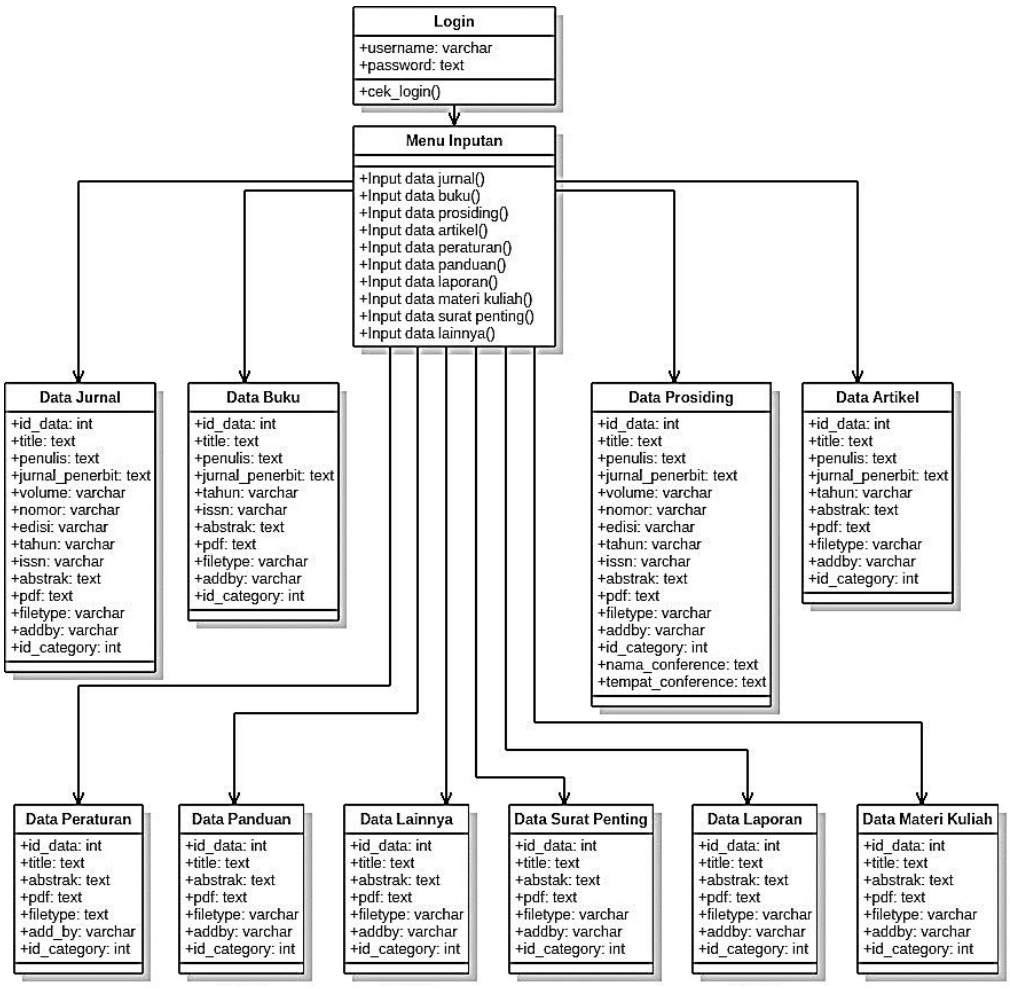

Figure 4. Repository Class diagram

2.2. Unified Modelling Language (UML)

Unified Modelling Language (UML) is a visual modelling language for systems or software that are object-oriented paradigms or enables processes. The UML was originally developed by Grady Booch, James Rumbaugh, and Ivar Jacobson in 1996 [9, 10]. The UML modelling is used to illustrate a complex problem so that it is easier to learn and understand. The UML defines notation and syntax or semantic which is a set of special forms in order to describe various software diagrams [11, 12]. In this research, UML diagrams consisting of use case, class, and deployment diagrams have been utilized.

3. Result and Discussion

The USDP and UML have been implemented for repository information system in the Mulawarman University. All USDP process have been applied. Meanwhile, UML i.e., use case, class, and deployment diagrams have been used. Use case is used to describe the user system. Class diagrams is used to describe the system or software and the relationships between classes. Then, deployment diagram is used to describe the repository system architecture related hardware. Figure 2. Briefly, the overall steps are as follows.

First, model analysis is to explain system planning from the observation, interview and study literature. In this experiment, use case diagram of repository with three actors consist of guest, user and root have been used. The use case diagram can be seen in Figure 3.

Second, model design is to describe repository system based on use case diagram. This step is explained by the class diagram of the system development [13]. In this repository system, four tables namely tb_data, tb_category, tb_tautan and tb_user have been created. Furthermore, twelve relationship included *login*, *Entry Menu*, *Journals*, *Books*, *Proceedings*, *Articles*, *University Regulatory*, *Guidance's*, *Reports*, *Course Materials*, *Letters* dan *others* academic data have been produced. The repository class diagram is presented in Figure 4.

Third, model implementation is translated of the model design system into programming language. In this project, PHP and MySQL database have been utilized. Then, repository menu facilities in frontend consists of home, how to use, contact, login and search. Meanwhile, backend module is root login that have ten menus in dashboard, http://repository.unmul.ac.id.

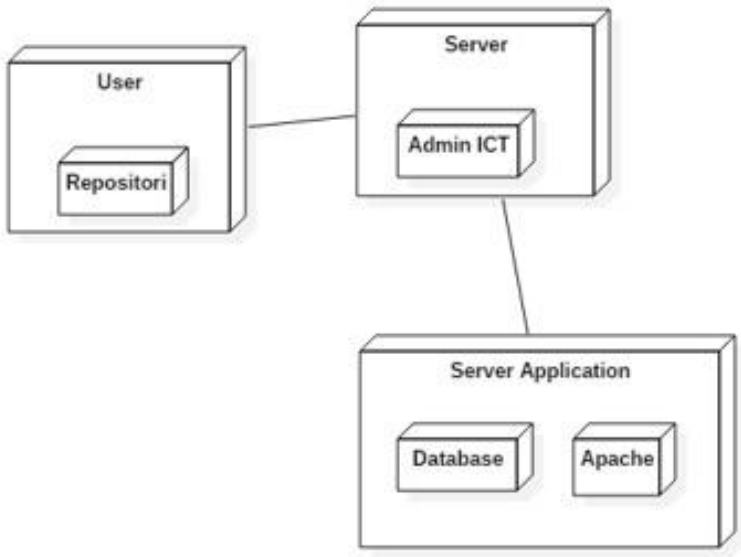

Figure 5. Repository Deployment

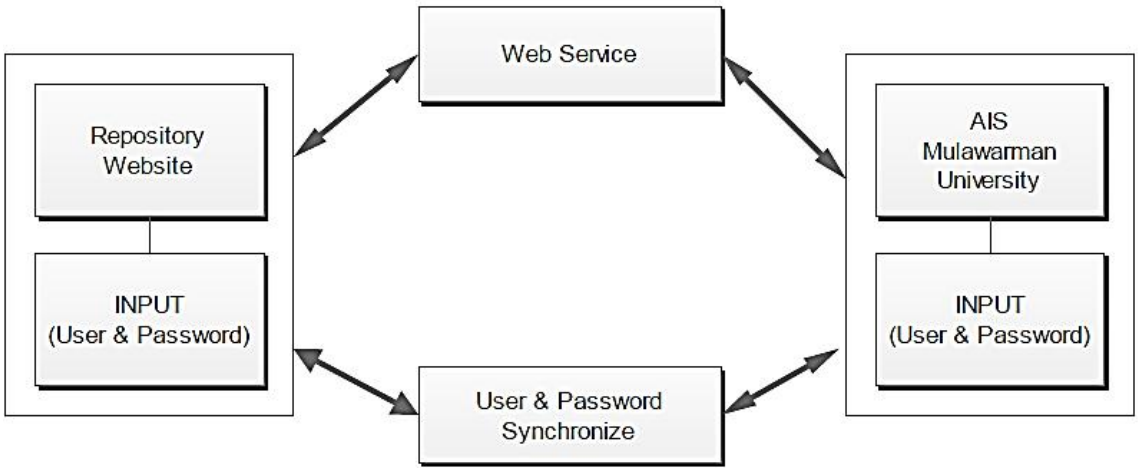

Figure 6. Repository Web service

Fourth, model deployment. This model is to describe the repository system related hardware architecture. The model deployment architecture can be visual in Figure 5. In this experiment, repository system also has a web service facility that integrated with academic information system (AIS) of Mulawarman University. This facility is single username for lecturer, researcher and student as a control when using this system. In other words, this system as an academic portfolio. The repository web is pointed in Figure 6.

Lastly, model test. A software testing is an important technique for assessing the quality of a software product [14]. In this study, the test model by using black-box testing model have been performed. This model is used to testing perform of the repository system.

4. Conclusion

The USDP and UML to build a repository information system at Mulawarman University has been presented. All USDP method stages have been implemented. Then, UML consists of use case, class, and deployment diagrams have also been applied. Meanwhile, testing model of repository system by using black-box testing. Based-on test result, the repository system for the academic community of Mulawarman University have been runs smoothly that as expected.

Acnowledgments

We would like to thank Lembaga Penelitian dan Pengabdian kepada Masyarakat (LP2M) Mulawarman University for helping in providing data and information in completing this research.

References

[1] Gu, V C, Cao, Q and Duan, W 2012 Unified Modeling Language (UML) IT adoption—A holistic model of organizational capabilities perspective *Decision Support Systems* ***54***(1) pp 257-69.

[2] Distefano S, Puliafito A and Scarpa M 2011 A representation method for performance specifications in UML domain. *Computers in Human Behavior* ***27***(5) pp 1579-92.

[3] Exposito E 2010 PBL methodology: a problem-based learning method applied to Software Engineering In *Proc. IEEE Edu. Eng.(EDUCON)* pp. 1577-83.

[4] Di Tria F, Lefons E and Tangorra F 2012 Hybrid methodology for data warehouse conceptual design by UML schemas *Information and Software Technology* ***54***(4) pp.360-79.

[5] Abdelmonem A and Khamis A 2002 *The unified software development process and framework development* Master's thesis (Universidade do Cairo) the 5th Int conf on Multimodal interfaces.

[6] Khairina DM, Maharani S and Hatta H R 2018 Sistem Informasi Manajemen Ruang (Simeru) Kelas (Studi Kasus: FKTI Universitas Mulawarman) *Informatika Mulawarman: Jurnal Ilmiah*

Ilmu Komputer ***13***(1) pp 30-32.
[7] Sutisna N 2013 *Pembuatan Sistem Informasi Repository Fakultas Ilmu Pengetahuan Budaya Universitas Indonesia Berbasis Web Dengan Menggunakan Metode Waterfal*l Master, (Universitas Gunadarma)
[8] Millet P A 2013 Toward a model-driven, alignment-oriented ERP methodology *Computers in Industry* ***64***(4) pp 402-11.
[9] Oriol X and Teniente E 2017 Simplification of UML/OCL schemas for efficient reasoning *Journal of Systems and Software* ***128*** pp 130-49.
[10] Bashir R S, Lee S P, Khan S U R, Chang V and Farid S 2016 UML models consistency management: Guidelines for software quality manager *International Journal of Information Management* ***36***(6) pp.883-99.
[11] Lambolais T, Courbis A L, Luong H V and Percebois C 2016 IDF:A framework for the incremental development and conformance verification of UML active primitive components *Journal of Systems and Software* ***113*** pp 275-95.
[12] Group O M 2016 Unified Modeling Language (UML) Version 2.5.
[13] Jin L. and Liang X 2016 August. Modeling of Instant Messaging System Based on RUP and UML *Computational Intelligence and Applications (ICCIA) 2016 International Conference on* IEEE pp 61-6
[14] Boukhris S, Andrews A, Alhaddad A and Dewri R 2017 A case study of black box fail-safe testing in web applications *Journal of Systems and Software* ***131*** pp 146-67.