AMITY INSTITUTE OF INFORMATION TECHNOLOGY
AMITY UNIVERSITY UTTAR PRADESH

Organizes

2018 7th International Conference on Reliability, Infocom Technologies and Optimization (ICRITO)

(Trends and Future Directions)

Prof. / Dr. / Ms. / Mr. Mira Ziveria

of INSTITUT TEKNOLOGI DAN BISNIS KALBIS - INDONESIA

has participated in the 2018 International Conference on Reliability, Infocom Technologies and Optimization (ICRITO) (Trends and Future Directions) during August 29-31, at Amity University, Noida, Uttar Pradesh.

He/She also chaired/co-chaired a session / delivered a keynote address/invited talk/ presented a paper titled

Saving and Loan Information System of Cempaka Cooperative Web Based

Prof. (Dr.) Sunil Kumar Khatri
General Chair, ICRITO 2018
Director, AIIT, AUUP

August 29-31, 2018

Technically Co-Sponsored By

IEEE IEEE UP SECTION (INDIA)

Prof. (Dr.) Balvinder Shukla
Patron, ICRITO 2018
Vice Chancellor, AUUP

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2018 7th International Conference on Reliability, Infocom Technologies and Optimization (ICRITO)

(Trends and Future Directions)

August 29-31, 2018

Venue
Amity University Uttar Pradesh, Noida, India

Organized by

Amity Institute of Information Technology (AIIT)
Amity University Uttar Pradesh, Noida, India

In association with

Technically Co-sponsored by

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First Impression: 2018

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Founder President's Message

I am delighted to know that Amity Institute of Information Technology (AIIT), Noida is organizing **7th International Conference on Reliability, Infocom Technologies and Optimization (ICRITO'2018)** from Wednesday, the 29th August to Friday, the 31st August 2018 at Amity University Uttar Pradesh (AUUP).

The theme of the Conference is extremely important and after going through the program in all details, I find that very few Conferences make the base for knowledge dissemination and provide such further visionary thought-provoking ideas, which offer unlimited scope of further research and innovation as this Conference. The themes to be deliberated during the conference are of extreme relevance to today's development in the conference areas. Each theme has a very special significance, just name the few: Quality and Reliability, Mathematical Modelling & Optimization, Networks, Communications and Cyber Security, Software Engineering, Internet-Of-Things, Artificial Intelligence and Experts Systems, Natural Language Processing, Mobile Computing, Safety and Risk Analysis.

I appreciate the support provided by IEEE UP Section & Indian Space Research Organization (ISRO) to AIIT in organizing this great event at Amity University Uttar Pradesh (AUUP). My compliment to Universidad Nacional de La Pama (UNLPam), Argentina; St. Petersburg Polytechnic University, St. Petersburg, Russia; Daffodil International University, Bangladesh; Divsar (R&D Organization), Argentina; IETE, India and Society for Reliability, Engineering, Quality and Operations Management (SREQOM), India for being the Knowledge Partners of the Conference.

The presence of several distinguished speakers and worthy participants from overseas and India will immensely enhance the value of this event and they would be able to establish significant and long-term contacts, forging bonds and mutual cooperation between Amity University and several participating universities, institutions and organizations, particularly from countries like USA, China, Germany, UK, Australia, Japan, South Africa, UAE, South Korea, Argentina, Malaysia, Oman, Turkey, Jordan, Indonesia, Morocco, Sri Lanka, Slovak Republic, Malta and Bangladesh.

I am confident that the Conference would be highly outcome-based and greatly result-oriented & would provide further vision for future. I extend a very cordial welcome to all worthy participants and wish them fruitful deliberation and also a pleasant stay.

My hearty compliments and appreciation for Prof. Sunil Kumar Khatri, General Chair & Director, Amity Institute of information Technology (AIIT), AUUP along with his dedicated Organizing Core Team for all the hard work put in by them and also I appreciate the full involvement of all faculty members, PhD Fellows, students and staff in ensuring the success of the Conference.

I wish the Conference a grand success.

Ashok K. Chauhan

(Dr. Ashok K. Chauhan)
President, Amity Institute of Information Technology (AIIT) &
Founder President
Ritnand Balved Education Foundation (RBEF)
(The Foundation of Amity Institutions and the
Sponsoring Body of Amity Universities)

Chancellor's Message

Dr. Atul Chauhan
President, Ritnand Balved Education Foundation
Chancellor, Amity University UP

MESSAGE

The IEEE 7th International Conference on Reliability, Infocom Technologies and Optimization (ICRITO'2018) organized by Amity Institute of Information Technology (AIIT), AUUP aimstoexplore growingadvancementsin the fields of Reliability and Quality, AI, Networks and Communications, IoT, NLP, Mobile Computing, Software Engineering, Safety and Risk Analysis & Mathematical Modelling & Optimization. We thank the IEEE UP Section for technically sponsoring & Indian Space Research Organization (ISRO) and Defence Research and Development Organization (DRDO) for supporting AIIT in organizing this great event at Amity University.

I am sure that this conference will provide an interactive platform to all the participants to widen their knowledge domain and to explore and exchange new ideas, techniques and models in the area of Reliability, Infocom Technologies and Optimization.

I welcome all the delegates and speakers from all over the world at Amity University participating in the conference. I commend the remarkable efforts of the Conference Team to organize this conference at international level. My congratulations to Dr. Sunil Kumar Khatri and the Organizing Team for the efforts put for conduct of the conference.

Dr. Atul Chauhan

Patron's Message

Prof. (Dr.) Balvinder Shukla
Professor of Entrepreneurship & Leadership
Vice Chancellor, Amity University Uttar Pradesh

MESSAGE

Riding on the success of its past conferences over several unique themes and critical acclaim, I am immensely ecstatic to inform you that Amity Institute of Information Technology (AIIT) in association with Computer Society of India (CSI) and IEEE, is organising 7th International Conference on "Reliability, Infocom Technologies and Optimization (ICRITO' 2018) on the theme 'Trends and Future Directions' from August 29-31, 2018 at Amity University Noida Campus.

This conference will provide a unique platform to researchers, academicians, industry experts, young professionals, scholars etc., to widen their knowledge domain, explore and exchange new ideas, provide different insights and deliberate on various significant topics of today's competitive world such as Quality and Reliability, Mathematical Modelling & Optimization, Networks, Communications and Cyber Security, Software Engineering, Internet-Of-Things, Artificial Intelligence and Experts Systems, Natural Language Processing, Mobile Computing, Safety, Risk Analysis etc.

I am happy to share that the Call for papers on these relevant topics had an overwhelming response. I convey my heartfelt gratitude to all the distinguished researchers, academicians and industry experts from various reputed Universities and research organizations from India and abroad such as DRDO, ISRO, BARC, NDA, CSIO, SL, NPTI, IITs (Kanpur, Banaras, Jharkhand and Mandi), IITM Gwalior, IIM Lucknow, NITs (Delhi, Karnataka, Calicut, Silchar, AP and Durgapur), JNU, JMI, DTU, IGDTUW, GBU, RTU, PU, AU, CU, Amrita and VIT for their meaningful contributions.

Further, this Conference will also bring together the renowned experts from the core field and other allied areas to forge linkages and bonds for mutual research benefits. The sessions during the Conference will be informative, interactive and valuable to all the participants and surely they will benefit immensely from the in-depth knowledge and experience of eminent speakers from all over the world.

I congratulate AIIT Organising team for their remarkable efforts for organising such Conferences. It is only through such dedication and perseverance that one can achieve excellence.

I take this excellent opportunity to convey my best wishes to all the delegates, speakers and researchers from all over the world and wish them a great learning experience as well as a pleasant stay in Delhi NCR.

Wishing ICRITO'2018 a grand success!

Prof. (Dr.) Balvinder Shukla

AMITY UNIVERSITY
UTTAR PRADESH

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FAMS, FABMS, FIMSA, FIANS, FIAY

President
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Director General, Amity Directorate of Science & Innovation,
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(Former Distinguished Scientist and Chief Controller R&D(LS), DRDO)
Tel: 91(0)120 4392045 / 91-9871372441 / 91-9818801028
Fax: 91(0)120 4392114, E-mail: wselvamurthy@amity.edu

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It gives me immense pleasure to know that Amity Institute of Information Technology is organizing 7th International Conference on Reliablity, Infocon Technology and optimization (ICRITO'2018) between 29-31 August 2018. This conference is making a mark during the last six years as an Annual event. Every time many eminent speakers from round the world join and share their source of knowledge.

The various sessions which have been planned meticulously will have great positive impact on various cross section of the society. These sessions will prove beneficial to each and every participant and would promote the importance of Quality and Reliability, Information Technology, Mathematical Modelling, Optimization, Networks, Communications and Cyber Security, Safety and Risk Analysis and Humanitarian Technologies.

I extend my heartfelt wishes to all the members who are instrumental in organizing this conference. The outcome of this conference will open up new avenues for collaborative research endeavors in emerging fields of Information Technology.

My best wishes for the success of the "ICRITO'2018".

Dr. W. Selvamurthy

Room No.114, 1st Floor, J-3 Block, Amity University Campus, Sector - 125, Noida - 201 313, Gautam Buddha Nagar, U.P. (INDIA)
Tel:+91(0)-120-4392045, Fax:+91(0)-120-4392114

Prof. Sunil Kumar Khatri
Director, Amity Institute of Information Technology
Additional Director, Amity Directorate of Engineering & Technology
Amity University Uttar Pradesh

MESSAGE

I alongwith Organizing Team of 7th International Conference on Reliability, Infocom Technologies and Optimization (ICRITO'2018), welcome all the speakers and delegates to Amity University, a campus with state-of-the-art modern facilities. A milestone in Amity's unceasing endeavor for achieving educational excellence is the establishment of the Amity University Uttar Pradesh as a pace setting University. With the blessings of our beloved Founder President Dr. Ashok K Chauhanand under the vibrant leadership of dynamic Chancellor Dr. Atul Chauhan,University is committed to providing skill-based quality education comparable to the best by international standards and it subscribes to the philosophy of blending modernity with tradition and nurturing talent.

Conference is organized with an aim toexplore growingadvancementsin the fields of Reliability, Infocom Technologies and Optimization. We had got an overwhelming response with speakers and delegates from USA, China, Germany, UK, Australia, Japan, South Africa, UAE, South Korea, Argentina, Malaysia, Oman, Turkey, Jordan, Indonesia, Morocco, Sri Lanka, Slovak Republic, Malta and Bangladesh. Conference will provide a common platform to leading scientists, academicians, researchers, government officials, practicing engineers, industry professionals and students to share their research experiences and views. Besides, it will help in sharing of experience and exchange of ideas, which will foster International/National collaboration.

I quote our Hon'ble Founder President Sir, Dr. Ashok K Chauhan that *At Amity we believe in building long-term sustainable and fruitful relationships*. I welcome again all the delegates and wish for all a comfortable and memorable stay and outcome-based event for all.

Prof. Sunil Kumar Khatri
General Chair, ICRITO'2018

Keynote Address/
Invited Talk Speakers

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<td> </td>
<td>Prof. Hoang Pham
Department of Industrial and Systems Engineering
Rutgers University
Piscataway, New Jersey, USA</td>
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<td>Prof. Yu-Jin ZHANG
Director, Institute of Information Cognition and Intelligent Systems
Department of Electronic Engineering
Tsinghua University, Beijing, China</td>
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<td>Prof. P K Kapur
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Amity Centre for Interdisciplinary Research
Amity University Uttar Pradesh,
Noida, India</td>
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<td>Prof. YANG Bo
Deputy Head,
Collaborative Autonomic Computing Lab.
School of Computer Science and Engineering
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Head, Software Engineering Laboratory
Division of Information Systems
University of Aizu, Japan</td>
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<td>Prof. Vipin Chaudhary
SUNY Empire Innovation Professor
Department of Computer Science and Engineering,
State University of New York (SUNY) at Buffalo (UB)
Director, Data Intensive Discovery Initiative (DI^2)
Computer Aided Diagnostics & Interventions Laboratory
Accelerated Computing Laboratory (ACL)
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<td>Prof. Jianhua Ma
Faculty of Computer and Information Sciences,
Hosei University, Tokyo, Japan
Chair of IEEE Technical Committee on Smart World
Chair of IEEE Technical Committee on Cybermatics</td>
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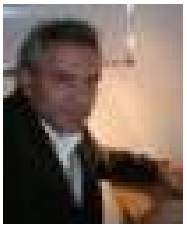
	Dr. Serge Autexier *DFKI Research Fellow,* Director of 'Bremen Ambient Assisted Living Lab DFKI Bremen, Cyber-Physical Systems Bremen, Germany		**Prof. Néstor Ruben Barraza** *Full Professor at Universidad Nacional de Tres de Febrero* Part Time Professor at University of Buenos Aires Argentina
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Universiti Tun Hussein Onn Malaysia
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University of Malta, Malta

Acknowledgement

We wish to express our appreciation and sincere gratitude to our beloved and visionary Dr. Ashok K Chauhan, Hon'ble Founder President, Ritnand Balved Educational Foundation (RBEF) and dynamic leader Dr. Atul Chauhan, Hon'ble Chancellor, Amity University Uttar Pradesh (AUUP) for their constant encouragement and guidance during the conduct of the ICRITO'2018 Conference from the proceedings of which this book has evolved. Support of Vice-Chancellor, AUUP Prof. (Dr.) Balvinder Shukla was already been there for us whenever needed.

We like to thank Prof. S N Singh, IEEE India Council President-Elect, Prof. Kumar Vaibhav Srivastava, Chairman, IEEE UP Section and Execom members for helping us by IEEE UP Section technically co-sponsoring the conference. We like to acknowledge CSI for their support to organize the conference.

We like to express our thanks to Universidad Nacional de La Pampa (Argentina), St. Petersburg Polytechnic University (Russia), Daffodil International University (Bangladesh), Divsar (Argentina), IETE (India) and SREQOM (India) to be Knowledge Partner for the conference.

We are thankful to ISRO, DRDO, PepsiCo, CoCubes, ATS, Intectools, ON THE BEDS.com, Ceramic Pro, GFD, R.R. Jewellers, Fashioto, TRUTH, BAS PLAST Inc., Shiv Shakti Bedsheets Ashok Nagar Delhi and Vivarte for supporting the Conference.

We are thankful to our eminent speakers for participating in the conference and making it a success. We gratefully acknowledge the contribution from authors of the papers included in the volume. We like to acknowledge the support of session chairs. We like to thank all the technical program committee members who had helped us in the rigorous and timely review process.

We would like to specially mention the help and support given by Prof. Ajay Rana, Director, ATPC towards making this conference successful.

We would like to mention the continuous hard work put by Conference Secretary Ms. Rachna Jain; Conference Technical Co-Chairs Dr. Subhranil Som, Dr. Ajay Vikram Singh and Dr. Mayank Sharma; Sponsorship Team of Dr. Laxmi Ahuja and Ms. Rajbala Simon; Finance Chair Mr. S K Jha, Web Committee Chair Ms. Monika Sharma, all the faculty members and student volunteers of various teams to ensure the success of the conference.

Publication of this book within time would not have been possible without the support of our publishers, Excellent Publishing House, New Delhi.

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Saving and Loan Information System of Cempaka Cooperative Web Based

Elena Caroline[1], Mira Ziveria[2]

[1,2]Faculty of Creative Industry, Institut Teknologi dan Bisnis Kalbis
Pulomas Selatan Street 22nd Lots, East Jakarta, 13210, Indonesia
[1]elenacaroline@yahoo.com, [2]mira.ziveria@kalbis.ac.id

***Abstract*: Cempaka Cooperative is a type of savings and loan cooperative that perform members data management and their conventional transaction, so it has the risk of data inaccuracies and the length of time required for data management. This study aims to build a savings and loan information system on Cempaka Cooperative in web based using prototype system development method which includes system analysis that use flowchart, system design that use Unified Modeling Language (UML) modeling, encoding that use Hypertext Preprocessor (PHP) programming language, data storage using MySQL, and system testing that use black box testing. The results of this study is a system that can be used to manage data member, savings transactions, loan transactions, cash withdrawal transactions, and loan installment transactions.**

Keywords: **Saving and loan, prototype, UML, PHP, MySQL**

I. INTRODUCTION

Cooperative is a business entity consisting of persons or legal entity cooperative with the base of its activities based on the principle of cooperatives as well as a people's economic movement based on the principle of kinship and can be an alternative financing to increase working capital and investment for small and medium entrepreneurs. Savings and Loans cooperatives are cooperatives with savings and loan services business for their members. Savings and loan cooperatives carrying out their activities based on the principle of kinship are useful to educate members to actively save regularly and can form their own capital from the savings and can also lend funds to cooperatives for venture capital [1].

The Cempaka Cooperative was founded by the unifying ties of regional and environmental people at St. Paskalis Church on July 22, 2001 and located at St. Paskalis Church, Jakarta, Indonesia. The initial capital amount is Rp 430, 000 and the member's deposit until December 2016 is Rp 339, 343, 650. The management of Cempaka Cooperative is currently led by Mr. Tjhin Wie Nen. The number of officers in charge of running cooperative activities each week amounted to 3 people, namely Mrs. Margaret Christine, Mrs. Mary Magdalena Juniati, and Mrs. Tan Giok Kiaw. Members of the Cempaka Cooperative are the people whose residence is under the aegis of the Parish of Cempaka Putih, the Church of St. Paskalis which is divided into 10 regions and each region is divided into 5 to 7 neighborhoods. Area coverage starts from Sumur Batu, Kemayoran, Serdang, Cempaka Baru, Harapan Mulia, Rawa Selatan, Galur, Tanah Tinggi, Rawa Sari, Mardani, Kali Baru, and Cempaka Putih (Cempaka Putih Barat, Cempaka Putih Tengah, Cempaka Putih Utara, Cempaka Putih Timur). In Desember 2016, total members are 186.

The main activity of Cempaka Cooperative is to provide saving and lending services for its members. Cempaka Cooperative has several facilities to serve the member's savings and loan transactions such as member book, credit slip and debit slip. The cooperative officers also have a data card as their data storage container for recording each of member's savings and loan transaction data. Any savings and loan transaction data recorded in the member book, it will be recorded also on the data card. Currently the system that runs in Cempaka Cooperative is still run conventionally such as recording data of the members, saving transaction data, loan transaction data, payment transaction data of loan installment and cash withdrawal transaction data.

From all analyzes of the current process of savings and borrowing activities, researchers get summarized some obstacles experienced by officers so far i.e (1) Search saving and loan data members will require a longer time, especially when members do not remember the number of member book (*Buku Anggota* or BA) because officers will search the member data one by one based on member's name; (2) Assignment of BA number to new member still by manual means officer must check the last BA number so it also takes a longer time; (3) In the registration of new members, to ensure that the prospective member has not been registered in the membership of the cooperative, the officer shall first check the data of the registered member. After member data is checked, the new officer can process the registration of candidate member data. Although there has never been a double member data error on Cempaka Cooperative, the process still takes a little longer; (4) Officers must perform repetition in recording data saving and loan that is in member book, data card, credit slip and debit slip. The officer also repeats the recording again on the final recap of the day, transferring the data from the credit slip (*Slip Uang Masuk* or SUM) to the summary of SUM and data from the debit slip (*Slip Uang Keluar* or SUK) to the summary of SUK. Recording of data repeatedly will take longer and may result in inaccurate data; (5) In making a data report member, officers must enter or update member data from a member book or data card into Microsoft Excel. In

making savings and loan reports, officers should also include or update the savings and loan data of each member from SUM summaries and summary of SUK or from member books and data cards. Report generation activities on the current system also take longer.

Based on the above problems, the formulation of the problem in this research is how to build web-based savings and loan information system on Cempaka Cooperative that can help the cooperative officers in performing data processing members, savings transactions, loan transactions, cash withdrawal transactions and loan installments quickly and accurate.

II. LITERATURE REVIEW

In this section the researchers cite references related to the research theme from various sources such as journals and books such as about saving and loan cooperatives, related previous research, information system, prototype system development method, database, MySQL software, system flowchart, Unified Modeling Language, web and black box testing.

A. Information System

Information Systems is a system within the organization that brings daily transaction management needs, supports operations, managerially, and strategic activities of an organization and provides certain outside parties with the required reports [2].

B. Method of Prototype Development System

Prototype method is a system development method that presents a complete picture of the system and the user can see the modeling of the system from the display side and procedural techniques to be built. Stages of prototype method that is identification and analysis of system requirements, system design, software coding, testing and system implementation [3].

C. Database

The database is a related set of data that connect each other logically and an explanation of the data, designed to find the data needed by an organization. Database design is divided into 3 phases: conceptual, logical, and physical database design. Entity Relationship Model is used as a tools of communication between database designers and users of the system during the analysis or design phase of the database development process in the framework of the development of information systems as a whole. Entity Relationship Diagram is a diagram to illustrate the conceptual design of the conceptual model of a relational database [4]. MySQL is a relational database software that is Relational Database Management System (RDBMS) that uses database language Structure Query Language (SQL) [5].

D. System Flowchart

System flowcharts are used to simplify a set of processes or procedures to facilitate user understanding of the information. The design of a flowchart should be concise, clear, and logical. System flowchart symbols can be categorized into 4 parts namely input and process, output, storage, and others [6].

E. Unified Modelling Language (UML)

UML is the standard specification language used for documenting, specifying and building software. UML is a methodology in developing object-oriented systems and is also a tool to support system development. Tools used in object-oriented design based on UML include Use Case Diagrams, Actifity Diagrams, and Class Diagrams [7].

F. Web

The Web is a collection of pages displaying text data, motionless or motion picture data, animation data, sound, video and or all of them, both static and dynamic, forming a series of interconnected buildings in which each is linked to a hyperlink [8].

G. Black Box Testing

Black box testing is software testing for functional requirements. This test aims to check whether the application is running as expected [9]. There are two ways of testing with black box testing that is (1) alpha test is to test the system directly by way of trial data, that is by entering the appropriate data or correct and also with the wrong data; and (2) beta test method is system testing done objectively that is direct to general user by using questionnaire to know opinion of respondent to built system. The results of the test will be written on the given questionnaire [10].

H. Previous Research

There is a relevant previous research that is the research that produces information systems that can help improve the efficiency of work in Cooperative Mitra Mandiri which facilitate treasurer in recording transactions of cooperative members using Waterfall system development method [11].

III. RESEARCH METODOLOGY

This section will describe the research materials, system development methods, and testing methods.

A. Research Materials

During this research, researchers conducted interviews with the heads of cooperatives and cooperative officers to find out every process of recording and processing of savings and loan data that run in Cempaka Cooperative until current date, the obstacles often faced by the heads of cooperatives and the officers with a system that runs in the current, and the expected needs of the new system development. Researchers also make direct observations for 2 months in the Cempaka Cooperative to see the practice and flow of processes undertaken by cooperative officers in serving the needs of member transactions.

B. System Development Methods

Researchers undertake the development of a new system in the flow of savings and loan activities process in Cempaka

Cooperative by using the method of prototype system development. The steps taken are analysis, design, encoding, testing, and system implementation.

C. Testing Methods

Test method used is black box testing, where the user considers the software is a black box that sees software from the front end side only without knowing what the contents or codes in the black box. Testing to know that the software performs the function as expected. Testing is documented in written form and aims to check whether the application is running as expected. Functional testing involves how well the system performs its functions including user commands, data manipulation, search and business processes, screen users, and integration. The framework of Cempaka Cooperative development is illustrated in Figure 1.

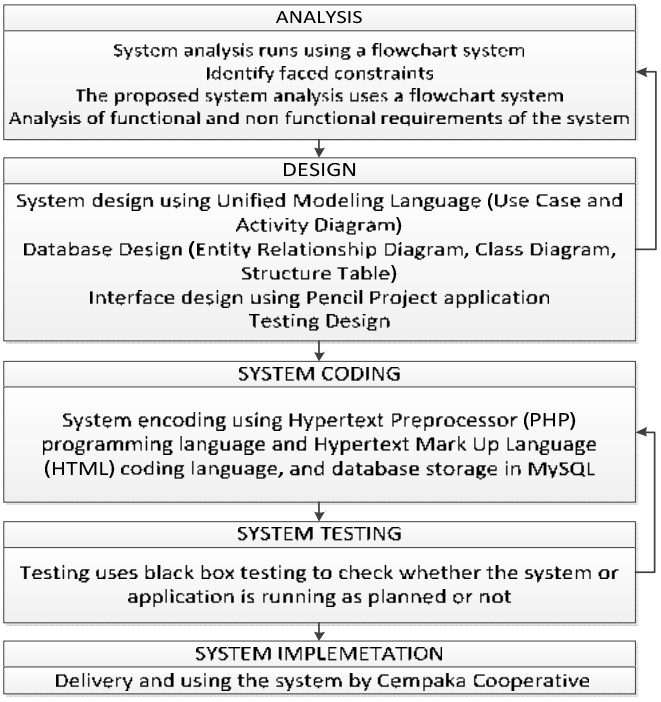

Fig. 1. Framework of Developing Cempaka Cooperative System

IV. DISCUSSION

In this section will be explained about the system analysis, system design, system coding results and test results that have been conducted.

A. System Analyses

In performing analysis on the system that is currently running conventionally used flowchart to be able to describe the work flow process and data performed. There are several flowcharts generated from the analysis of the current system i.e member registration process, savings process, loan process, loan installment payment process, cash withdrawal process, end of day recap process, member data reporting process, and process of making savings and loan report. The saving process flowchart on the old system can be seen in Figure 2.

B. Proposed System Analysis

In the proposed system, the main recording and processing of data and transactions conducted on the system so as to facilitate officers and heads of cooperatives in doing savings and loan activities as well as in making a summary of money coming in and money out and preparing reports. However, in this proposed system, the member book will still be used because the member book is still a formal requirement of the Cempaka Cooperative organization as well as a proof of membership for Cempaka Cooperative members. Every time the transaction, after the officer to input data into the system, the officer only copy the data once in the book members. On the right-hand side of each row of data in the member book there is a paraf column. During the conventional system that has been running, the column is only filled by the officers. However, in the system that the researcher proposes, officers and members will equally give paraf to the column. The ink color of the pen used by officers and members to give the initials can be differentiated. Initial is a proof of receipt that the transaction has been completed.

In performing analysis on the proposed system used flowchart to be able to describe the flow of work processes and data performed on the proposed system. There are several flowcharts generated from the proposed system analysis namely member registration process, savings process, loan process, loan installment payment process, cash withdrawal process, end-of-day recap process, member data reporting process, and savings and loan reporting process. The saving process flowchart on the proposed system can be seen in Figure 3.

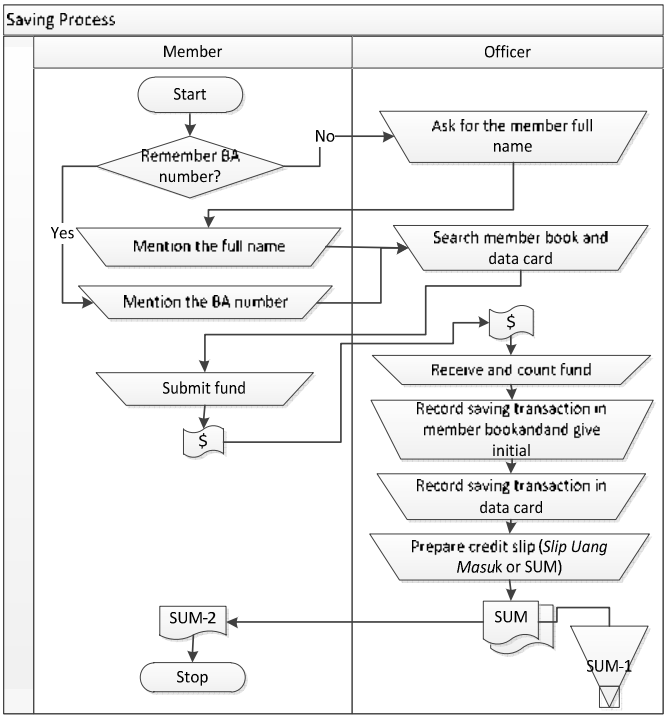

Fig. 2. Flowchart of Saving Process on Old System

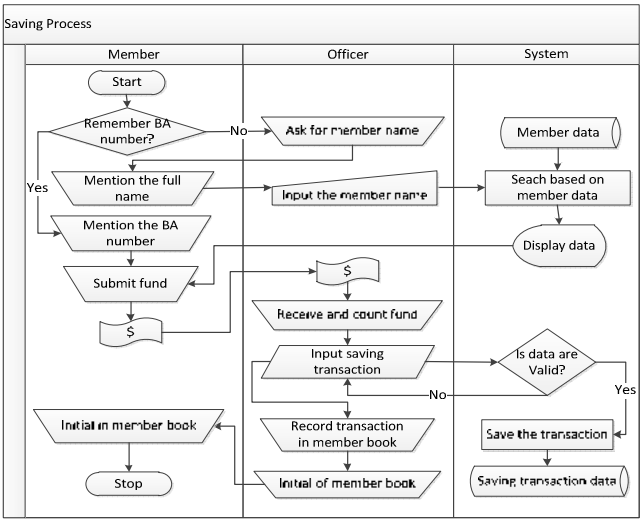

Fig. 3. Flowchart of Saving Process on Proposed System

C. Requirements Analysis

TABLE I: FUNCTIONAL REQUIREMENTS

OFFICER AND HEAD OF COOPERATIVE	
Function	**Description**
Login	To enter the system
Member data processing	Input, edit, and delete member data. Search member data based on BA number or member's name. Display the detail of member private date in PDF form. Display member's saving transaction data in PDF form. Display member's loan transaction data in PDF form.
Saving transaction processing.	Input saving transction. Delete or cancel saving transaction. Search saving trasanction based on BA number.
Loan transaction processing.	Input loan transction. Delete or cancel loan transaction. Change the status of loan transaction to paid-off loan. Search loan trasanction based on BA number or loan number.
Loan installment transaction processing	Input loan installment transation Delete or cancel loan installment transaction. Search loan installment trasanction based on BA number or loan number.
Cash withdrawall transaction processing	Input cash withdrawall transation Delete or cancel cash withdrawall transaction. Search cash withdrawall trasanction based on BA number.
HEAD OF COOPERATIVE	
Function	Description
Admin data processing	Input, edit, and delete admin data. Search admin data based on username or admin name.

Functional requirements are necessities that contain functions that the system can perform. In the system to be proposed there are 2 users of officers and heads of cooperative. There are several functions for each user that will be displayed in the menus of the designed application along with the features in each function. Functional requirements for officers and heads of cooperatives are described in Table I.

From data processing and conducted transactions, the system will produce output that can accessed by officers and head of cooperatives as follows: (1) Summary of entry money and cash outflow. Search and display data of all transactions daily based on selected date in PDF form; (2) Member data reports.Search and display member data from start of cooperative establishment to selected date in PDF form; (3) Savings and Loans Report. Finding and displaying total deposits (principal savings, mandatory savings, voluntary savings) and remaining loan of all members from start of cooperative establishment to date selected in the form of PDF and Microsoft Excel.

Non functional requirements is a requirement that refers to the tools used in running a system, can be seen in Table II.

TABLE II : NON FUNCTIONAL REQUIREMENTS

Tools	Non Functional Requirements
Hardware	• 1 unit of HP Pavilion 14-AC186TU Core i3-5005U, RAM 4GB notebook • 1 unit of Mouse
Software	• Windows 7 or Windows 10 Operating System • Mozilla Firefox Browser. • XAMPP V.3.2.1 (phpmyadmin, apache, MYSQL). • Adobe Reader PDF and Microsoft Excel. • Notepad++
Security	• The application system with *password*. • The pages on the application system can not be directly opened without login.
Notification	• Used to display notification of success or failure of functions that run on the system. • Used to display information in filling in the columns when sending data are not filled. • Used to display information to confirm changes and deletion of data.

D. System Functional Design

In performing system functional design, UML is used use case diagram and activity diagram. Use cases diagram describe simply the main functions of the system and the various users that can interact with the system [12]. From the discussion conducted with the user, obtained the necessary needs on

information systems to be used such as the functions contained in the system, the purpose of the functions provided, the actors or users who can use these functions, as well as interaction between actor with the function. There are two actors who can interact with the system and perform the existing functions of the head of the cooperative and the officer as described in Figure 4.

Head of the cooperative has a special function that can register officers to admin applications and perform other data processing such as edit, delete, and search data. All other functions can be done by the head of the cooperative and officers. In the main functions there are also features of data processing and transaction processing such as edit, delete, and search data. In view report function, the head of cooperative and officer can search member data report and savings and loan report based on selected date, then report will be displayed in PDF form with period of time from start of cooperative stand up to date selected. To view the sums of money coming in and out, users can search for a summary of the money based on the date selected, the incoming and outgoing summarized sum will be displayed in PDF format and contains information about all transactions made on the day as well as information about the amount of cash inflow and cash outflow there that day.

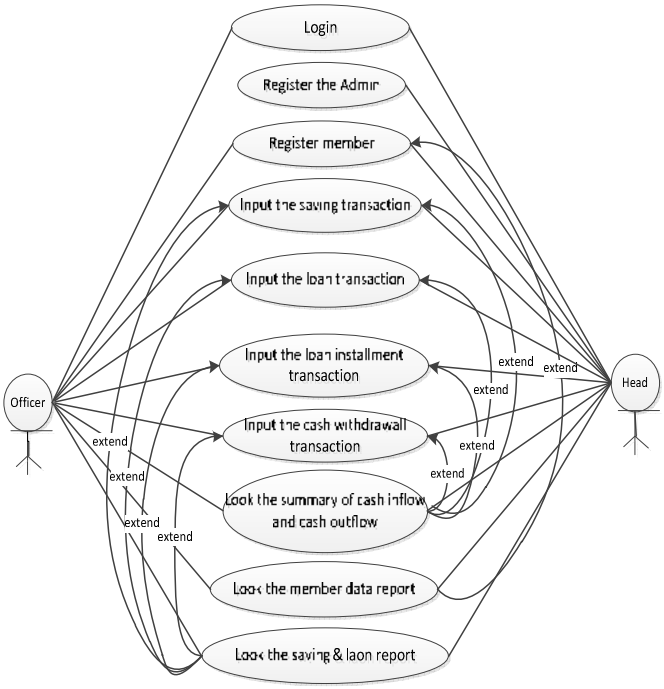

Fig. 4. Use Case Diagram

Activity Diagram describes the workflow or activity of a system or business process [13]. By using activity diagrams, workflow or process designed on the system in Cempaka Cooperative. There are several work processes on the system i.e. login, admin registration, member registration, savings transaction, loan transaction, loan installment transaction, cash withdrawal transaction, incoming and outgoing cash sum, member data report, and savings and loan report. Activity Diagram of Deposit Transactions may be dumped on Figure 5.

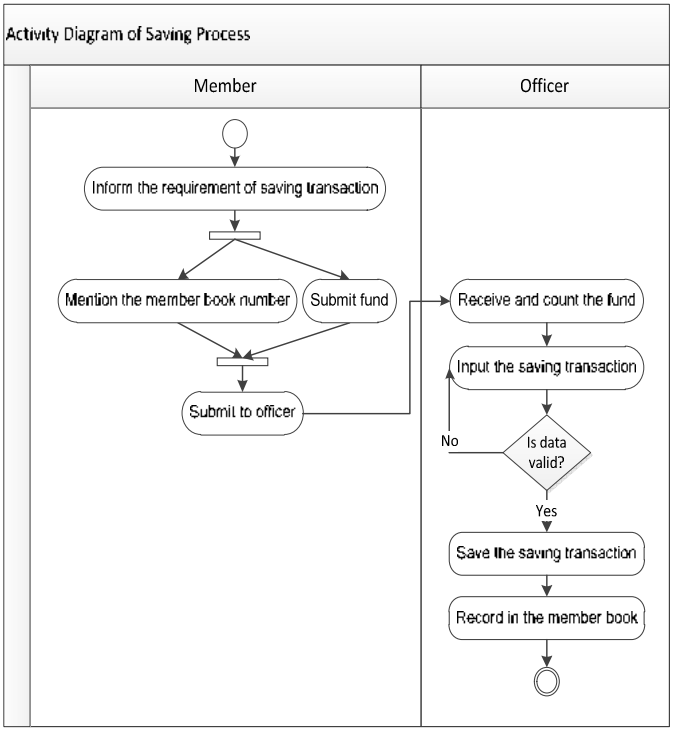

Fig. 5. Activity Diagram of Saving Process

E. Database Design

Database design is divided into 3 levels: conceptual level using Entity Relationship Diagram (ERD), logic level using Class Diagram, and physical level using Table Structure. ERD is described in Figure 6 and Class Diagram is depicted in Figure 7.

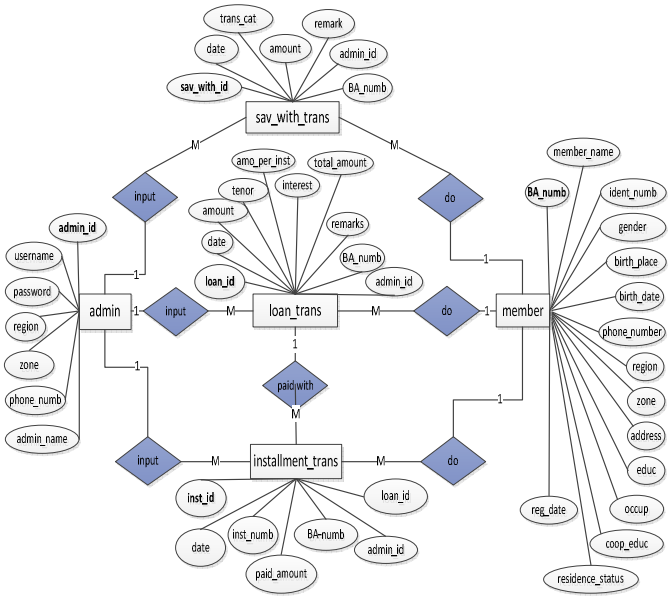

Fig. 6. Entity Relationship Diagram

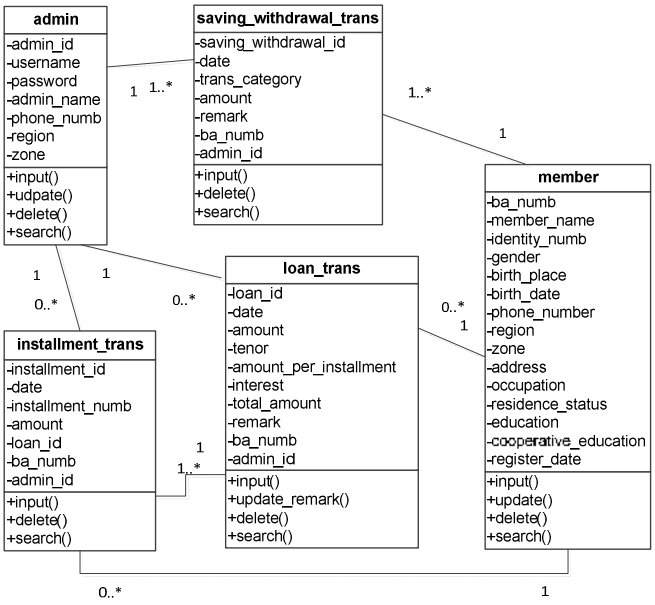

Fig. 7. Class Diagram

No more than 3 levels of headings should be used. All headings must be in 10pt font. Every word in a heading must be capitalized except for short minor words as listed in Section III-B.

F. Interface Design

Interface design is built using Pencil Project application. Designed interface for the system is the main page and login design, homepage, members, member registration form, saving transaction, savings transaction input, loan transaction, loan transaction input, cash withdrawal transaction, cash withdrawal transaction input, loan installment transaction, installment transaction, member data report, savings and loan report in pdf, savings and loan report in Microsoft Excel, summary of cash inflow and cash outflow. Figure 8 is the interface design for saving transactions.

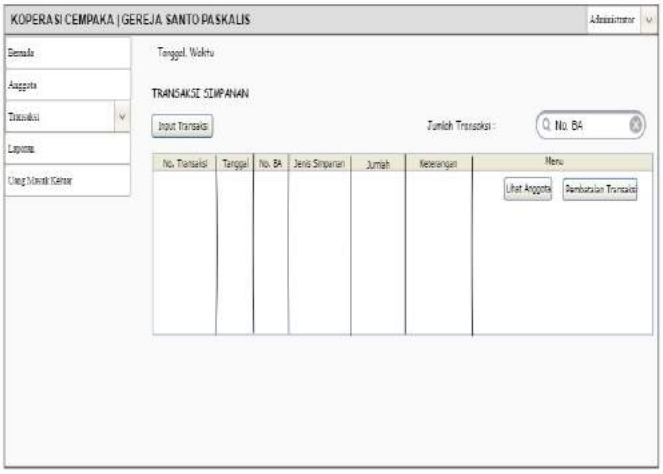

Fig. 8. Interface Design untuk Transaksi Simpanan

G. System Encoding Results

Some examples of system encoding results can be seen in Figure 9 for login interfaces, Figure10 for the transaction interfaces stored, and Figure 11 for the data report saving and loan interface in PDF form. Login interface is the main page of the application. This page serves as an entrance for officers and heads of cooperatives to use applications. Login is done by entering usename and password. The transaction interaction of deposits contains all transactions that have been performed or stored on the system. At the top left of the table there is a menu to perform input transactions, at the top right of the table provided features to search transactions and displayed information on the number of transactions available. On each transaction line is provided menu to cancel the transaction. Also provided menu to view details of data members who make transactions because the table only inform BA number of members who make the transaction. Interface of savings and loan data report in pdf format contains information about total deposits and residual loan of each member based on period from start of cooperative stand up to date selected in PDF form.

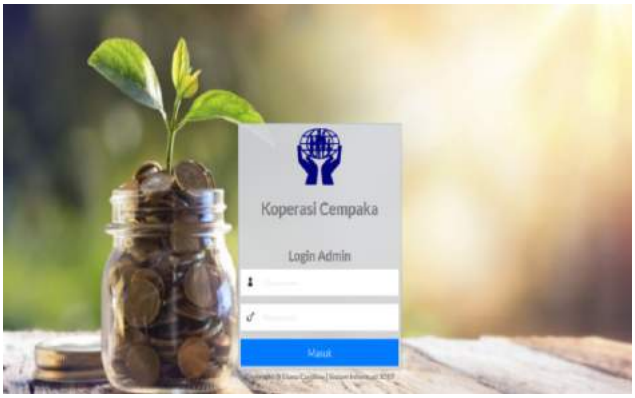

Fig. 9. Login Interface

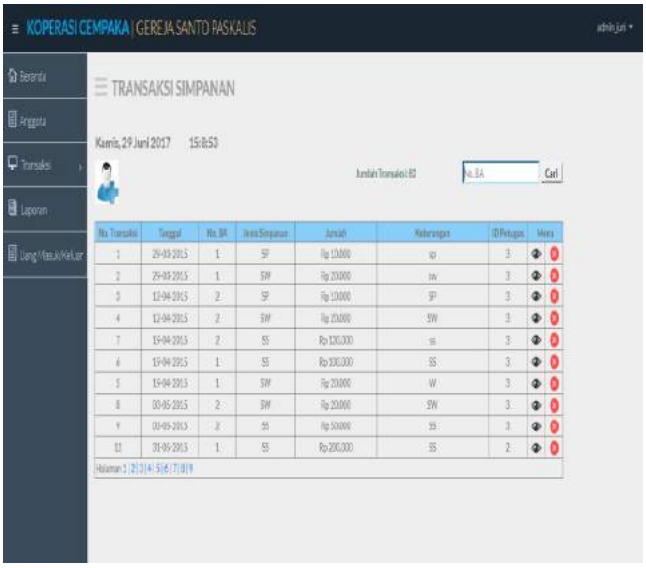

Fig. 10. Interface of Saving Transaction

LAPORAN SIMPAN PINJAM ANGGOTA

KOPERASI CEMPAKA
GEREJA SANTO PASKALIS

Per Tanggal: 29-06-2017

No. BA	Nama Anggota	Simpanan			Total Simpanan	Sisa Pinjaman
		Pokok	Wajib	Sukarela		
1	Bernadette Frisca	10.000	430.000	800.000	1.240.000	0
2	Monika Della Rosa Pratiwi	10.000	340.000	370.000	720.000	0
3	Fransiskus Andy Susanto	10.000	440.000	2.400.000	2.850.000	1.650.000

Fig. 11. Interface of Savings and Loans Data Report in PDF Format

H. System Test Results

The system was tested using black box testing. The result of system testing is for login function, admin data, member data, savings transaction, loan installment transaction, cash withdrawal transaction, sum of money entry and exit, member data report, and savings and loan report, all can run as planned.

V. CONCLUSIONS

After conducting research and development of savings and loan information system at Cempaka Cooperative web based can be concluded that (1) system can be built with prototype development method with stages of analysis, designing, coding, testing and implementation; (2) The system can be used to manage member data, savings transactions, loan transactions, cash withdrawal transactions, and loan installment transactions and generate sums of entry and exit money, member data reports, and savings and credit reports.

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