Proceedings ICETD 2012
The First International Conference in Engineering and Technology Development

Universitas Bandar Lampung
20 - 21, June 2012
Lampung, Indonesia
The First International Conference on Engineering and Technology Development (ICETD 2012) 
Faculty of Engineering and Faculty of Computer Science, Universitas Bandar Lampung

PREFACE

The activities of the International Conference is in line and very appropriate with the vision and mission of the UBL to promote training and education as well as research in these areas.

On behave of the First International Conference of Engineering and Technology Development (ICETD 2012) organizing committee; we are very pleased with the very good responses especially from the keynote speakers and from the participants. It is noteworthy to point out that about 45 technical papers were received for this conference.

The participants of conference come from many well known universities, among others: Universitas Bandar Lampung, International Islamic University Malaysia, University Malaysia Trengganu, Nanyang Technological University, Curtin University of Technology Australia, University Putra Malaysia, Jamal Mohamed College India, ITB, Mercu Buana University, National University Malaysia, Surya Institute Jakarta, Diponogoro University, Unila, Universitas Malahayati, University Pelita Harapan, STIMIK Kristen Newmann, BPPT Lampung, Nurtanio University Bandung, STIMIK Tarakanita, University Sultan Ageng Tirtayasa, and Pelita Bangsa.

I would like to express my deepest gratitude to the International Advisory Board members, sponsors and also welcome to all keynote speakers and all participants. I am also grateful to all organizing committee and all of the reviewers which contribute to the high standard of the conference. Also I would like to express my deepest gratitude to the Rector which give us endless support to these activities, such that the conference can be administrated on time.

Bandar Lampung, 20 Juni 2012

Mustofa Usman, Ph.D
ICETD Chairman
PROCEEDINGS
The First International Conference in Engineering and Technology Development (ICETD 2012)
UNIVERSITAS BANDAR LAMPUNG
Bandar Lampung, Indonesia
June, 20-21 2012

Sterring Commitee
Chairman
Mustofa Usman

Co-Chairman
Marzuki

Technical Committee
Ahmad Cucus
Agus Sukoco
Dina Ika Wahyuningsih

Treasure
Maria Shusanti Febrianti

Committee Member
Indyah Kumoro
Fritz Akhdam Nuzir
Baginda Simaimban
Berry Salatar
Harpain
Yuthsi Aprilinda
Usman Rizal
Andala Rama P. Barusman
Yanuar Dwi Prasetyo

International Advisory Board
Ahmad F. Ismail, Malaysia
Hon Wei Leong, Singapore
Mustofa Usman, Indonesia
Imad Khamis, USA
Moses L. Singih, Indonesia
Y. M. Barusman, Indonesia
Andreas Dress, Germany
Rozlan Alias, Malaysia

Faiz A. M. Elfaki, Malaysia
Rudi Irawan, Indonesia
Warsono, Indonesia
Gusri Ibrahim, Indonesia
Raihan Othman, Malaysia
Jamal I Daoud, Malaysia
Zeng Bing Zen, China
Riza Muhida, Indonesia

Tjin Swee Chuan, Singapore
Heri Riyanto, Indonesia
Khomsahrial R, Indonesia
Agus Wahyudi, Indonesia
Rony Purba, Indonesia
Lilies Widojoko, Indonesia
Alex Tribuana S, Indonesia
Organizing Committee

Chair Person
Prof. DR. Khomsahrial Romli, M.Si

Vice Chair Person
Drs. Harpain, M.A.T., M.M

Secretary
Fritz Akhmad Nuzir, S.T., M.A
Ahmad Cucus, S.Kom., M.Kom

Treasure
Dian Agustina, S.E

Special Events
DR. Zulfi Diane Zaini, SH., MH
DR. Baginda Simaibang, M.Ed
Zainab Ompu Jainah, SH., MH
DR. Alex Tribuana S., ST., MM
Erlangga, S.Kom

Recepcionist
Berry Salatar, A.Md
Yanuar Dwi Prasetyo, S.Pd.I., M.A
Siti Rahma Wati, S.E
Ardiansyah, ST., MT
Sofie Islamia Ishaw, S.T., M.T
Taqwan Thamrin, S.T., M.Sc

Transportation and Accommodation
Irawati, SE
Usman Rizal, S.T., MMSi
Hendri Dunan, S.E., M.M
Rifandi Ritonga, S.H
Desi Puspita Sari, S.E
Roby Yuli Endra, S.Kom
Tanto Lailam, S.H
Ilyas Sadad, S.T., M.T

Publication and Documentation
Ir. Indriati Agustina Gultom, M.M
Monica Mutiara Tinambunan, S.I.Kom., M.I.Kom
Noning Verawati, S.Sos
Hesti, S.H
Rifandi Ritonga, SH
Olivia Tjioener, S.E., M.M  
Violita, S.I.Kom

Consumption
Dra. Yulfiwini, M.T  
Dra. Agustuti Handayani, M.M  
Susilowati, ST., MT  
Wiwin Susanty, S.Kom  
Reni Nursyanti, S.Kom  
DR.Dra. Ida Farida, M.Si

Facility and Decoration
Zainal Abidin, SE  
Ahyar Saleh, SE  
Eko Suhardiyanto  
Dina Ika Wahyuningsih, A.Md  
Wagino  
Sugimin
## Table Of Content

**Organizing Committee**

**Table Of Content**

<table>
<thead>
<tr>
<th>Keynote Speaker</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Zinc-Air Battery – Powering Electric Vehicles to Smart Active Labels</td>
<td>1</td>
</tr>
<tr>
<td>Dr. Raihan Othman</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Enhancing Heat Transper Using Nanofluids(abstract)</td>
<td>6</td>
</tr>
<tr>
<td>Prof. Ahmad Faris Ismail</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Rapid Prototyping and Evaluation for Green Manufacturing</td>
<td>7</td>
</tr>
<tr>
<td>Riza Muhida, Ph.D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Indonesia’s Challenge to Combat Climate Change Using Clean Energy</td>
<td>12</td>
</tr>
<tr>
<td>Rudi Irawan, Ph.D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Paraboloid-Ellipsoid Programming Problem</td>
<td>15</td>
</tr>
<tr>
<td>Prof. Dr. Ismail Bin Mohd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Model Development of Children Under Mortality Rate With Group Method of Data Handling</td>
<td>27</td>
</tr>
<tr>
<td>Dr. Iing Lukman</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>The Modified CW1 Algorithm For The Degree Restricted Minimum Spanning Tree Problem</td>
<td>36</td>
</tr>
<tr>
<td>Wamiliana, Ph.D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>The Fibre Optic Sensor in Biomedical Engineering and Biophotonics</td>
<td></td>
</tr>
<tr>
<td>Prof. Tjin Swee Chuan</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Web-Based Service Optimization with JSON-RPC Platform in Java and PHP</td>
<td>1</td>
</tr>
<tr>
<td>Wachyu Hari Haji</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Trouble Ticketing System Based Standard ISO10002: 2004 To Improve Handling of Complaints Responsibility</td>
<td>6</td>
</tr>
<tr>
<td>Ahmad Cucus, Marzuki, Agus Sukoco, Maria Shusanti Febrianti, Huda Budi Pamungkas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Design of Warehouse Management Application Tool for Controlling The Supply Chain</td>
<td>10</td>
</tr>
<tr>
<td>Anita Ratnasari, Edi Kartawijaya</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Development Of Decision Related Engine Using Integration Of Genetic Algorithm And Text Mining</td>
<td>15</td>
</tr>
<tr>
<td>Eviana Tjatur Putri, Mardalena, Asmah</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Implementing CBR on The College Rankings Based on Webometrics with EPSBED’s Data and Webometrics Knowledge</td>
<td></td>
</tr>
<tr>
<td>Title</td>
<td>Authors</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>6. Paypal Analysis as e-Payment in The e-Business Development</td>
<td>Nomi Br Sinulingga</td>
<td></td>
</tr>
<tr>
<td>7. Decision Support System for Determination of Employees Using Fuzzy Decision Tree</td>
<td>Sinawaty#1, YusniAmaliah</td>
<td></td>
</tr>
<tr>
<td>8. Analysis of Factors Influencing Consumer Behavior Bring Their Own Shopping Bag (Case Study KecamatanTembalang)</td>
<td>Aries Susanty, DyahIkaRinawati, FairuzZakiah</td>
<td></td>
</tr>
<tr>
<td>9. The Use of Edge Coloring Concept for Solving The Time Schedule Problem at Senior High School (Case Study at SMAN 9 Bandarlampung)</td>
<td>RahmanIndraKesuma, Wamiliana, MachudorYusman</td>
<td></td>
</tr>
<tr>
<td>10. Analysis Of Web-Education Based on ISO / IEC 9126-4 For The Measurement Of Quality Of Use</td>
<td>Marzuki, AgusSukoco, Ahmad Cucus, Maria ShusantiFebrianti, Lisa Devilia</td>
<td></td>
</tr>
<tr>
<td>11. The Used of Video Tracking for Developing a Simple Virtual Boxing</td>
<td>David HabsaraHareva, Martin</td>
<td></td>
</tr>
<tr>
<td>12. M-Government as Solutions for E-Government problems in Indonesia</td>
<td>Ahmad Cucus, Marzuki, AgusSukoco, Maria ShusantiFebrianti</td>
<td></td>
</tr>
<tr>
<td>13. Open Source ERP for SME</td>
<td>Tristiyanto</td>
<td></td>
</tr>
<tr>
<td>14. Improvement in Performance of WLAN 802.11e Using Genetic Fuzzy Admission Control</td>
<td>SetiyoBudiyanto</td>
<td></td>
</tr>
<tr>
<td>15. Cloud Computing: Current and Future</td>
<td>TaqwanThamrin, Marzuki, Reni Nursyanti, Andala Rama Putra</td>
<td></td>
</tr>
<tr>
<td>16. Implementing Information Technology, Information System And Its Application In Making The Blue Print for The One Stop Permission Services</td>
<td>Sri AgustinaRumaPea, HumuntalRumaPea</td>
<td></td>
</tr>
<tr>
<td>17. Integration System Of Web Based And SMS Gateway For Information System Of Tracer Study</td>
<td>EndykNoviyantono, Aidil</td>
<td></td>
</tr>
<tr>
<td>18. Fuzzy Logic Applied To Intelligent Traffic Light</td>
<td>EndyKNoviyantonio, Muhammed</td>
<td></td>
</tr>
<tr>
<td>19. Solving and Modeling Ken-ken Puzzleby Using Hybrid Genetics Algorithm</td>
<td>Olivia Johanna, Samuel Lukas, Kie Van IvanKapPutra</td>
<td></td>
</tr>
<tr>
<td>20. GIS Habitat Based Models Spatial Analysis to Determine The Suitability Of Habitat For Elephants</td>
<td>AgusSukoco</td>
<td></td>
</tr>
</tbody>
</table>
21. The Course Management System Workflow-Oriented to Control Admission and Academic Process
   Usman Rizal, Yuthsi Aprilinda ................................................................. 108

22. Fuzzy Graphs With Equal Fuzzy Domination And Independent Domination Numbers
   A. Nagoorgani, P. Vijayalakshmi .............................................................. 115

23. Solving Pixel Puzzle Using Rule-Based Techniques and Best First Search
   Dina Stefani, Arnold Aribowo, Kie Van Ivanky Saputra, Samuel Lukas ............ 118

24. Capacity Needs for Public Safety Communication Use 700 MHz as Common Frequency in Greater Jakarta Area
   Setiyo Budiyanto .................................................................................. 125

25. Impact of Implementation Information Technology on Accounting
   Sarjito Surya .......................................................................................... 132

26. Document Management System Based on Paperless
   Wiwin Susanty, Taqwan Thamrin, Erlangga, Ahmad Cucus .......................... 135

27. Traceability Part For Meter A14C5 In PT Mecoindo Of The Measurement Of Quality Of Use
   Suratman, Wahyu Hadi Kristianto, Asep Suprianto, Muhamad Fatchan, Dendy Pramudito ............ 139

28. Designing and Planning Tourism Park with Environment and Quality Vision and Information Technology-Based (Case Study: Natural Tourism Park Raman Dam)
   Fritz A. Nuzir, Agus Sukoco, Alex T ......................................................... 149

29. Smart House Development Based On Microcontroller AVR-ATMEGA328
   Haryansyah, Fitriansyah Ahmad, Hadriansa ........................................... 157

30. Analyze The Characteristic of Rainfall and Intensity Duration Frequency (IDF) Curve at Lampung Province
   Susilowati ............................................................................................... 161

31. The Research of Four Sugarcane Variety (Saccharum officinarum) as The Raw Materials of Bioethanol Production in Negara Bumi Ilir Lampung
   M.C. Tri Atmodjo, Agus Eko T., Sigit Setiadi, Nurul Rusdi, Ngatinem JP, Rina, Melina, Agus Himawan .......................................................... 174

32. Design an Inverter for Residential Wind Generator
   Riza Muhida, Afzeri Tamsir, Rudi Irawan, Ahmad Firdaus A. Zaidi ................. 177

33. The Research of Two Sugarcane Variety (Saccharum officinarum) as The Raw Materials of Bioethanol Production in Negara Bumi Ilir - Lampung
   M.C. Tri Atmodjo, Agus Eko T., Sigit Setiadi, Nurul Rusdi, Ngatinem JP, Rina, Melina, Agus H. .......................................................... 182

34. Design of Plate Cutting Machine For Cane Cutter (Saccharum Oficinarum) Use Asetilin Gas
   M.C, Tri Atmodjo, Tumpal O.R., Sigit D. Puspito ....................................... 186
35. Behaviour of Sandwiched Concrete Beam under Flexural Loading  
   Firdaus, Rosidawani ................................................................. 191

36. Diesel Particulate Matter Distribution of DI Diesel Engine Using Tire Disposal Fuel  
   Agung Sudrajad ........................................................................ 196

37. Microstructure Alterations of Ti-6Al-4V ELI during Turning by Using Tungsten Carbide  
   Inserts under Dry Cutting Condition  
   Ibrahim, G.A. Arinal, H, Zulhanif, Haron, C.H.C ................................................................. 200

38. Validation Study of Simplified Soil Mechanics Method Design with Kentledge Pile  
   Loading Test of Bored Pile  
   Lilies Widojoko ........................................................................ 204

39. Performance Assessment Tool for Transportation Infrastructure and Urban Development for Tourism  
   Diana Lisa .................................................................................... 211

40. Earthquake Resistant House Building Structure  
   Ardiansyah ................................................................................ 221
The Course Management System Workflow-Oriented to Control Admission and Academic Process

Usman Rizal#1 ,Yuthsi Aprilinda#2

#1,2 Faculty of Computer Science, Bandar Lampung University
ZA Pagar Alam St. No.26th, Bandar Lampung, Indonesia
#1 rizaixxx@yahoo.com
#2 yuthsi_april@yahoo.com

Abstract—Course Management System (CMS) is a secure web based management system which is specifically designed for controlling student’s admission and academic process. This system is designed to detail the activities streamline of student’s admission and academic process, such as how and when the application should be started, and how to coordinate the resources amongst other stakeholders. This system is designed based on the ISO 9001:2008 Management Quality System General Requirement Clause 4.1(b) and Clause 4.1(c).


1. INTRODUCTION

1.1 Background
Management of tasks related to academic works is complex. There are many aspects involved, starting from registration, staff management includes registration staff, lecturer, lecturer assistance, examinations and assessments at the end of semester, up to the need to track the student’s progress. Each activity has its own procedure, content, and a lot of resources. On the one side, the university development and the addition of both faculty and study programs require the use of more and more resources. If the needs for resources are not met, this will affect the overall academic service quality.

For that reason a Course Management System (CMS) is required, this system is designed to improve the academic service quality. CMS is a system designed to simplify, streamline, and automate aspects related to the academic process workflow, such as courses setting, class divisions, lecturer arrangements, module or guide book distributions, assignment submissions either individual or group assignment, examination, final assessment, and Study Result Card (KHS) printing.

CMS is an information technology-based system to control the execution of all those processes above in order to reach sustainability in the flow of academic service scheme process, including the registration and lecture process. CMS describes in detail the sequence of activity processes, such as when an activity should begin to be implemented and ended, what activities should be carried out next, as well as how to coordinate all these activities with stakeholders or other parties associated in the process as a whole. This is in line with the general requirements of standard quality management system ISO 9001:2008 Clause 4.1(b) which states that an organization must set the sequence and interaction of the process, and Clause 4.1 (c) which states that an organization must set the limits and methods needed to ensure the operation and controlling process run effectively.

The advantages which can be expected from the use of CMS applications with the workflow control support, in addition to maintaining the process sustainability in the faculty activities, it can also help the staff performance efficiency or other parties related to the process. The system is also expected to reduce the use of paper documents so it can minimize the possibility for documents to be broken, scattered, lost, and so forth. At the end, it is expected that the established system can be used to improve the academic service quality.

1.2 Workflow Modelling and Application
Workflow modelling is a representation of workflow application and how the application is technically will be executed, how the organization environment in which the application will be executed before the application can be used in the workflow management system (WFMS) [2].

In this regard, the data to be used in the modelling of workflow application [3] consists of:

a) The coordination structure of business process execution,
b) The sequence of execution process, and
c) Valid time (VT) or execution target date.

There are three types of modelling that can be used to model the workflow application [3].
1. Organizational Model
2. Process Model
3. Information Model

1.3 Quality Management System
According to SNI ISO 9000:2008, quality is the degree achieved by the inherent characteristics which fulfill the requirements. Meanwhile, quality management system is a management system which is used to control the organization in term of quality. Based on ISO 9001:2008 clause 4.1 about the General Requirements on the organization’s Quality Management System are as follows:

a) The organization must set the processes needed for quality management system and its implementation to the entire organization.

b) The organization must set the sequence and process of interaction.

c) The organization must set limits and methods needed to ensure that the operation and controlling process run effectively.

d) The organization must conduct monitoring, measurement, if possible, and analyze each process performed.

e) The organization must take necessary actions to achieve the planned results and continually make improvements to the processes within the organization.

1.4 Flowgraph and Cyclomatic Complexity

Flowgraph or signal flow graph is a representation method of the flow system consisting of nodes or points and are connected by lines or segments.

Cyclomatic Complexity is a method of flow measurement or independent flow in programming, when the syntax is executed. Cyclomatic Complexity is calculated using the equation:

\[ V(G) = e - n + 2 \]

where:
- \( V(G) \) is the cyclomatic complexity
- \( e \) is the number of edges
- \( n \) is the number of nodes

1.5 Rationale

This research was conducted to determine how to develop CMS application workflow oriented which can be used to control the workflow of new student’s registration and academic process. It has become a requirement for the institution or organization to set the sequence and interaction process, as well as to set the limits and methods needed to ensure that the operation and controlling process run effectively as stated in the Quality Management System Standard ISO 9001:2008 Clause 4.1 about the General Requirements for Quality Management System. The final goals for the implementation of ISO standard are to improve the student’s service quality, including new student’s registration and academic process.

Here is a chart of the rationale “The development of Course Management System Application Workflow-Oriented to Control Student’s Admission and Academic Process”.

II. RESEARCH METHOD

2.1 CMS Workflow Analysis at Administrator Level

Administrator in CMS is responsible for managing the workflow process, such as to add or change activities which must be performed in a continuous process.

Here is the design of CMS use case workflow administrator:

From this use case chart, it is known that there are two actors in the equal position, that is as the administrator but with different function. Interaction between objects are described in the Sequence Diagram below.
To set up the workflow using the application module, the process sequence is as follows:

**Activity Diagram/Chart** is a technique to describe procedural logic in administrator workflow. Here is an activity diagram for administrator workflow.

**Fig. 2.2 Sequence Chart Workflow Administrator**

**Fig. 2.3 Sequence Chart for Setting Workflow PMB**

*Fig. 2.4 Activity Diagram for Administrator Workflow*

**2.2 CMS Workflow at Stakeholder Level**

Use case for administration management is as follows:

*Fig. 2.5 Use Case for Registration Management*

Based on the above use case, registration sequence can be made as follows:

*Fig. 2.6 Acceptance Sequence of registration files for the user from marketing group*

*Fig. 2.7 Interview by Interviewer Team*
Activities undertaken in the process of new student admission in the CMS can be seen in the activity chart as follows:

Use case of lectures management is as follows:

Chart sequence for lectures management is as follows:

III. DISCUSSION

3.1 IMPLEMENTATION OF CMS SYSTEM
WORKFLOW ORIENTED

CMS system workflow oriented that was developed using the principles of decentralization, in which tasks and aspects related to the process will be directly handed over to the concerned staff, so that the interface which is built will have a different functions and appearances to the specific user. The system of access rights restrictions will be implemented to ensure that only the assigned person who can access a specific interface.
3.2 BLACKBOX TESTING

a. Menu Bar

<table>
<thead>
<tr>
<th>No.</th>
<th>Measured Objek</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Menu Bar</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Mouse Hover</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : Submenu appear</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Link to See Assignment in Menu Workflow</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Clicked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : User assignment table appear</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Link to See User Data in Menu Manajemen User</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Clicked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : Tabel user appear</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Link Add User</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Clicked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : User additional form appear</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Link Registration Database</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Clicked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : Registration Table Appear</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Link Student’s Database</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Clicked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : Student’s table appear</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Link Courses Database</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Clicked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : Courses list appear</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Link KMB Database</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Clicked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : Student’s score list appear</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Link Logout</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Clicked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : Log our from the system</td>
<td></td>
</tr>
</tbody>
</table>

b. Log-In Page

<table>
<thead>
<tr>
<th>No.</th>
<th>Measured Objek</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Textfield Username</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Input Username</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : Username appear</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Textfield Password</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Input Password</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : Password appear</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Login Knop</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Click</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : Enter to main page appropriate to session user</td>
<td></td>
</tr>
</tbody>
</table>

c. Administrator Page

<table>
<thead>
<tr>
<th>No.</th>
<th>Measured Object</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Link Waiting Assignment</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Clicked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : User assignment form appear</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Link Edit</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Clicked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : Edit application form appear</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Link Click to add application</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Action : Clicked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Result : Form to add application appear</td>
<td></td>
</tr>
</tbody>
</table>

3.3 WHITEBOX TESTING

Whitebox testing is used to measure things related to internal logical and code structure. The formula used in this testing is as follows:

Cyclomatic Complexity \( V(G) = E - N + 2 \)

Note : 
\( E = \text{Path/Jalur} \)
\( N = \text{Node} \)

Here is whitebox testing at:
1. Web User Page
   a. Flowchart Program

   ![Flowchart Program](image1)

   b. Flowgraph

   ![Flowgraph User](image2)

   c. Set Path Linier

   
   \[
   \begin{align*}
   &1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 \\
   &1 - 2 - 3 - 4 - 9 - 10 - 3 - 4 - 5 - 6 - 7 - 8 \\
   &1 - 2 - 3 - 4 - 5 - 6 - 14 - 13 - 3 - 4 - 5 - 6 - 7 - 8 \\
   &1 - 2 - 3 - 4 - 6 - 16 - 17 - 12 - 2 - 3 - 4 - 5 - 6 - 7 - 8 \\
   &1 - 2 - 3 - 4 - 5 - 6 - 7 - 2 - 3 - 4 - 5 - 6 - 7 - 8 \\
   \end{align*}
   \]

   d. Cyclomatic Complexity

   \[
   \begin{align*}
   V(G) &= E - N + 2 \\
   V(G) &= 13 - 11 + 2 \\
   &= 4 \\
   \end{align*}
   \]

2. Administrator Page
   a. Flowchart Program

   ![Flowchart Program Administrator](image3)

   b. Flowgraph

   ![Flowgraph Administrator](image4)

   c. Set Path Linier

   
   \[
   \begin{align*}
   &1 - 2 - 3 - 4 - 5 - 6 - 7 \\
   &1 - 2 - 3 - 4 - 5 - 6 - 2 - 3 - 4 - 5 - 6 - 7 \\
   &1 - 2 - 3 - 4 - 8 - 9 - 3 - 4 - 5 - 6 - 7 \\
   &1 - 2 - 3 - 4 - 5 - 10 - 11 - 3 - 4 - 5 - 6 - 7 \\
   \end{align*}
   \]

   d. Cyclomatic Complexity

   \[
   \begin{align*}
   V(G) &= E - N + 2 \\
   V(G) &= 13 - 11 + 2 \\
   &= 4 \\
   \end{align*}
   \]
### 3.4 TEST OF APPROPRIETY TO ISO STANDARD CLAUSE 4.1

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Software</th>
<th>ISO 9001 : 2008 clause 4.1</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detailing needed processes in student’s admission and academic workflow</td>
<td>home.php</td>
<td>Organization must set the needed processes for quality management system and its implementation to the entire organization.</td>
<td>Appropriate</td>
</tr>
<tr>
<td>The sequence of process and its interaction are managed based on the date and time of execution.</td>
<td>home.php</td>
<td>Organization must set the sequence and interaction of process.</td>
<td>Appropriate</td>
</tr>
<tr>
<td>There is link in each process that can be used by the user to update status or doing a process. This link will always be active during the time limitation of a process, and will be non-active when the execution time has over the limitation or when the process has been done.</td>
<td>home.php, mod_database.php</td>
<td>Organization must set the needed limit and method to ensure that the operation and controlling process run effectively.</td>
<td>Appropriate</td>
</tr>
<tr>
<td>Administrator set the execution for every needed process, and set the execution process time limitation to support the operation and controlling process.</td>
<td>mod_application.php, mod_assignment.php</td>
<td>Organization must ensure the availability of needed resources to support operation and controlling process.</td>
<td>Appropriate</td>
</tr>
<tr>
<td>Providing forms which can be used as method to implement the process, such as in interview files update form. This form is used to upload new student’s interview file or at score input form in lectures workflow.</td>
<td>mod_database.php</td>
<td>Organization must take needed action to reach planned result and continually improvement process.</td>
<td>Appropriate</td>
</tr>
</tbody>
</table>

### IV. CONCLUSION

From the research, it can be conclude that:

1. CMS application workflow-oriented can timeline staff or human resources management and simplify the process because of its decentralization characters.
2. By using CMS application workflow-oriented, monitoring process can be done in line with the general requirement of quality management system ISO 9001:2008 Clause 4.1.

### REFERENCES
