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The First International Conference in Engineering and Technology Development




Universitas Bandar Lampung
20 - 21, June 2012
Lampung, Indonesia

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

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UNIVERSITAS BANDAR LAMPUNG
Bandar Lampung,Indonesia
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The Course Management System Workflow-Oriented to Control Admission and Academic Process

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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).**

***Key Words*— CMS, PMB, IS0 9001:2008, Klausul 4.1, Web, Students.**

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 addiction 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 wich 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 Complexcity

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:

$$V(G) = e - n + 2, \text{ Note : } \quad G = \text{index flowgraph}$$

e = number of node
n = number of flow (flow)

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 neede to ensure that the operation and controlling process run effectively as stated in the Quality Managenent 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 acaemic 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".

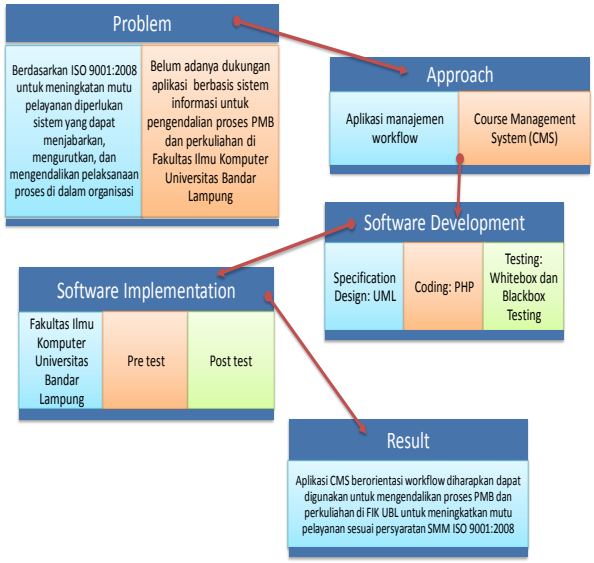

Fig. 1: Rationale

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:

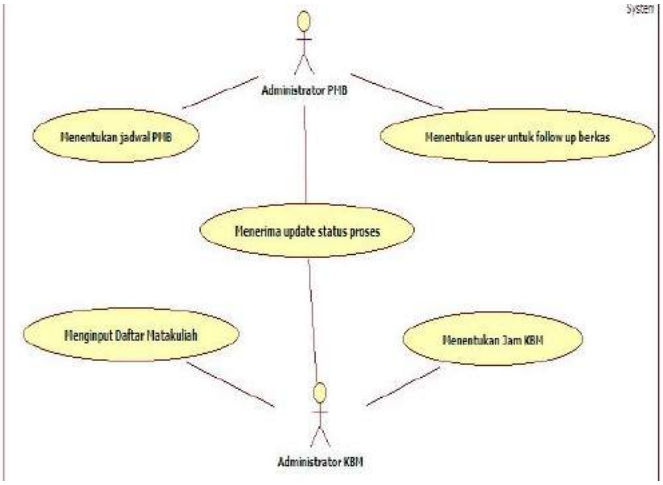

Fig. 2.1 Use Case Workflow Administrator

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.

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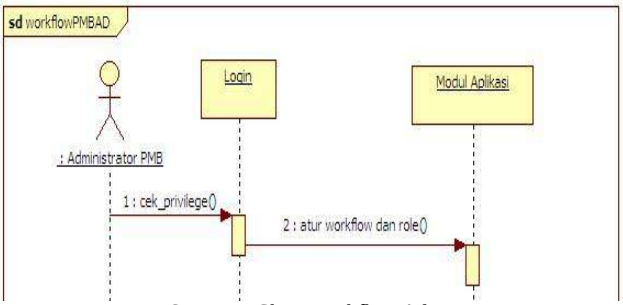


Fig. 2.2 Sequence Chart Workflow Administrator

To set up the workflow using the application module, the process sequence is as follows:

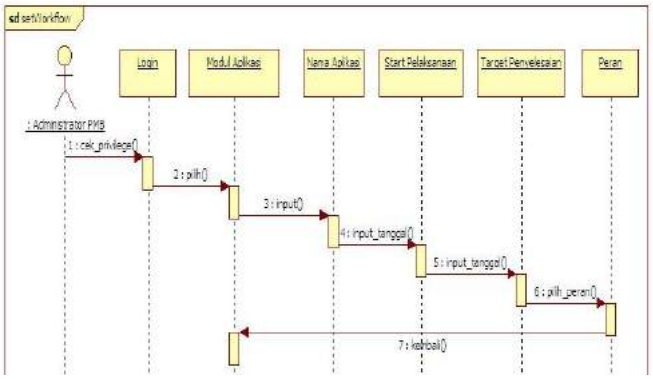


Fig. 2.3 Sequence Chart for Setting Workflow PMB

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

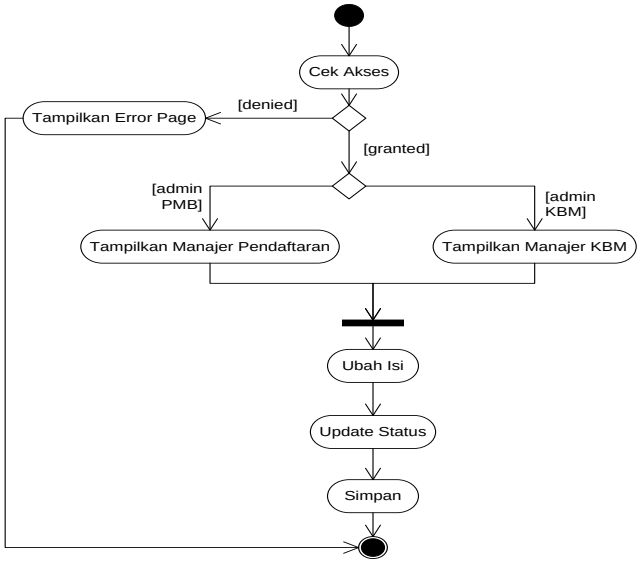


Fig. 2.4 Activity Diagram for Administrator Workflow

2.2 CMS Workflow at Stakeholder Level

Use case for administration management is as follows:

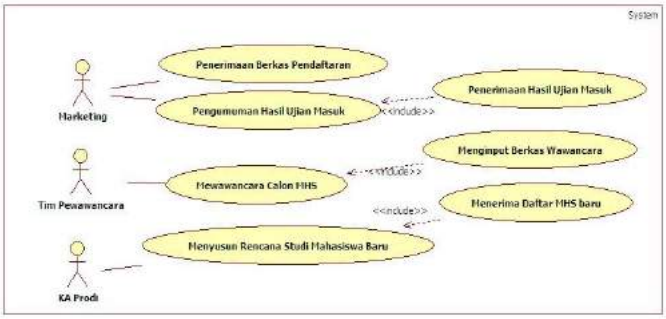


Fig. 2.5 Use Case for Registration Management

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

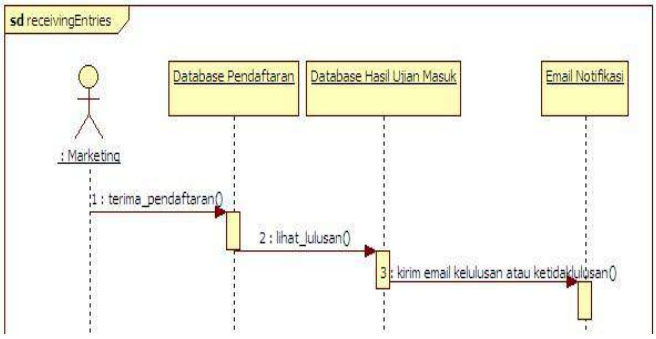
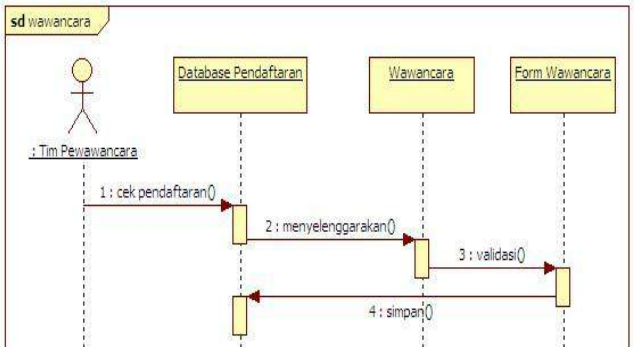


Fig. 2.6 Acceptance Sequence of registration files for the user from marketing group



'Fig. 2.7 Interview by Interviewer Team

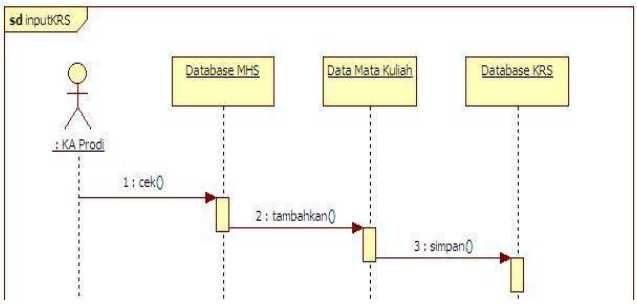


Fig. 2.8 Input KRS by The Head of Study Program

Activities undertaken in the process of new student admission in the CMS can be seen in the activity chart as follows:

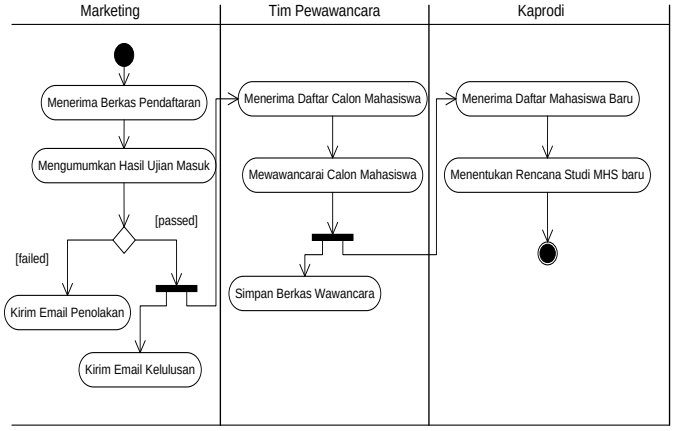


Fig. 2.9 Admission Chart Activity

Use case of lectures management is as follows:

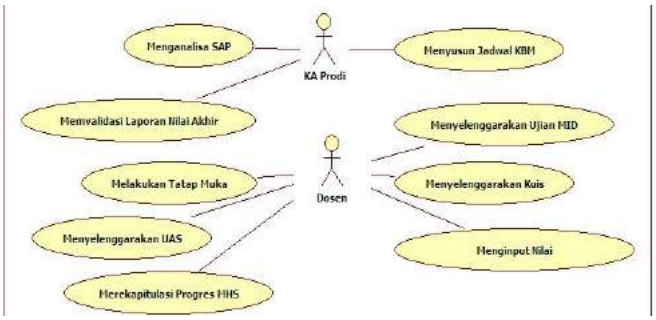


Fig. 2.10 Lectures Use Case Workflow

Chart sequence for lectures management is as follows:

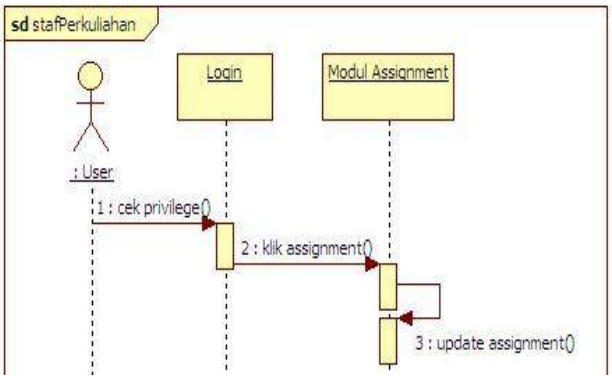


Fig. 2.11 Update assignment sequence

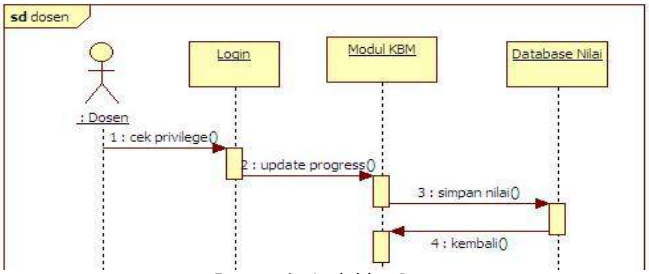


Fig. 2.12 Lecturer's Activities Sequence

2.3 Class Diagram Design

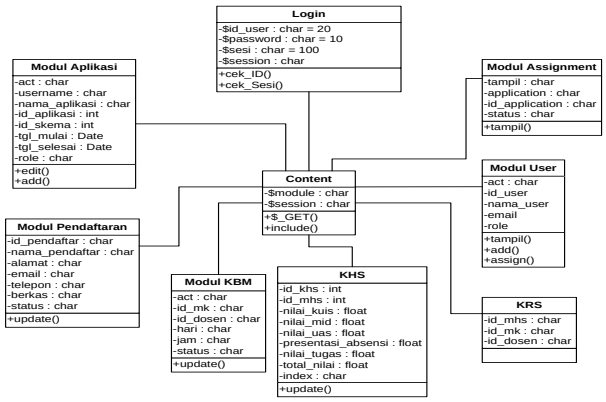


Fig. 3.16 Class Diagram

III. DISCUSSION

3.1 IMPLEMENTASION 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 acces rights restrictions will be implemented to ensure that only the assigned person who can access a specific interface.

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3.2 BLACKBOX TESTING

a. Menu Bar

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

b. Log-In Page

No.	Measured Objek	Result
1.	Textfield Username Action : Input Username Result : Username appear	Success
2.	Textfield Password Action : Input Password Result : Password appear	Success
3.	Login Knop Action : Click Result : Enter to main page appropriate to *session* user	Success

c. Administrator Page

No.	Measured Object	Result
1.	Link Waiting Assignment Action : Clicked Result : User assignment form appear	Success
2.	Link Edit Action : Clicked Result : Edit application form appear	Success
3.	Link Click to add application Action : Clicked Result : Form to add application appear	Success
4.	Addition knop at addition application form Action : Clicked Result : Date is added to database	Success
5.	Edit knop in Application edit form Action : Clicked Result : Data in database changed	Success

d. User Page

No.	Measured Object	Result
1.	Update Link for all user types Action : Clicked Result : Detail application page appear	Success
2.	Link New KRS (Head of Study Program user type) Action : Clicked Result : KRS filling form appear	Success
3.	Checkbox in KRS form (Head of Study Program user type) Action : Clicked Result : Check mark appear	Success
4.	Adding knop at KRS form (Head of Study Program user type) Action : Clicked Result : Data is added to database	Success
5.	Edit knop at application edit form (Head of Study Program user type) Action : Clicked Result : Data in database changed	Success
6.	ACK knop (Head of Study Program user type) Action: Clicked Result: Coloum content changed ACK	Success
7.	Adding knop at course time table form (Head of Study Program user type) Action: Clicked Result: Data is added to database	Success
8.	Update KBM (Lecturer user type) Action: Clicked Result: Student's score list appear	Success
9.	Student's score list update (Lecturer user type) Action: Clicked Result: Score update form appear	Success

3.3 WHITEBOX TESTING

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

Cyclomatic Complexcity V(G) = E – N + 2

Note : E = Path / Jalur
N = Node

Here is whitebox testing at:

1. Web User Page
   a. Flowchart
      Program

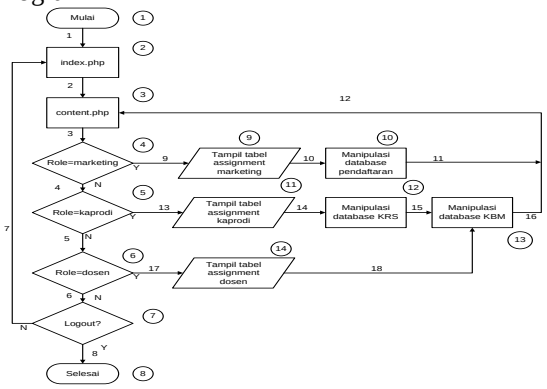

Fig. 3.1 Flowchart Program

   b. Flowgraph

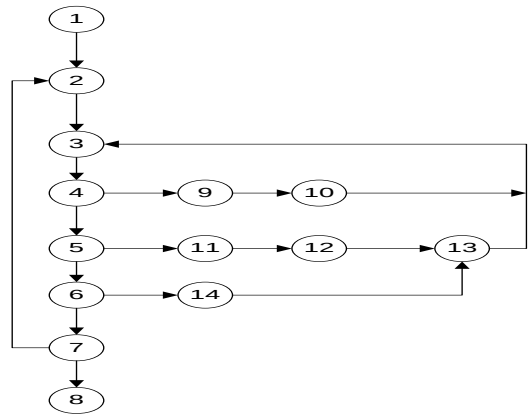

Fig. 3.2 Flowgraph User

   c. Set Path Linier

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 – 11 – 12 – 13 – 3 – 4 – 5 – 6 – 7 – 8
1 – 2 – 3 – 4 – 5 – 6 – 14 – 13 – 3 – 4 – 5 – 6 – 7 – 8
1 – 2 – 3 – 4 – 5 – 16 – 17 – 12 – 2 – 3 – 4 – 5 – 6 – 7 – 8
1 – 2 – 3 – 4 – 5 – 6 – 7 – 2 – 3 – 4 – 5 – 6 – 7 – 8

   d. Cyclomatic Complexity

V(G) = E – N + 2
V(G) = 18 – 14 + 2
= 6

2. Administrator Page
   a. Flowchart Program

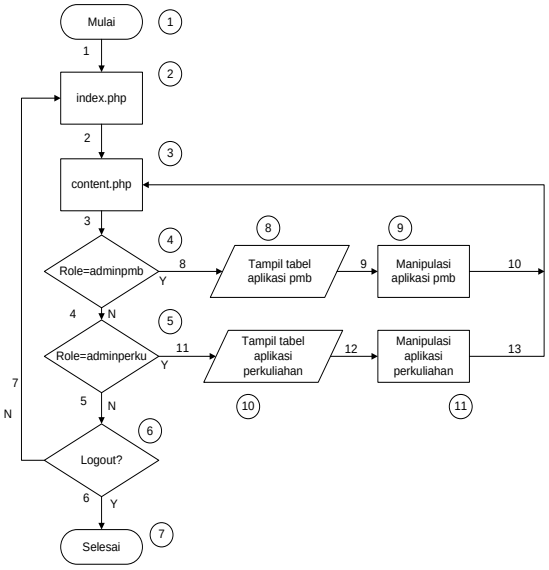

Fig. 3.3 Flowchart Program Administrator

   b. Flowgraph

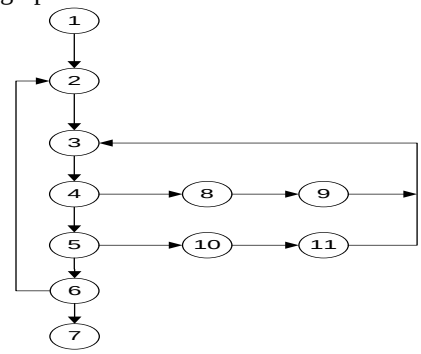

Fig. 3.4 Flowgraph Program Administrator

   c. Set Path Linier

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

   d. Cyclomatic Complexity

V(G) = E – N + 2
V(G) = 13 – 11 + 2
= 4

3.4 TEST OF APPROPRIETY TO ISO STANDARD CLAUSE 4.1

Prosedure	Software	ISO 9001 : 2008 clause 4.1	Result
Detailing needed processes in student's admission and academic workflow	home.php	Organization must set the needed processes for quality management system and its implementation to the entire organization.	Appropriate
The sequence of process and its interaction are managed based on the date and time of execution.	home.php	Organization must set the sequence and interaction of process.	Appropriate
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.	home.php, mod_database.php	Organization must set the needed limit and method to ensure that the operation and controlling process run effectively.	Appropriate
Administrator set the execution for every needed process, and set the execution process time limitation to support the operation and controlling process.	mod_application.php, mod_assignment.php	Organization must ensure the availability of needed resources to support operation and controlling process.	Appropriate
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.	mod_database.php	Organization must take needed action to reach planned result and continually improvement process.	Appropriate

IV. CONCLUSSION

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.

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