

# IMPLEMENTATION OF SINGLE SIGN ON USING THE CONCEPT OF METHOD OAUTH (OPEN AUTHORIZATION) ON THE WEB PORTAL

<sup>1</sup>AWAN SETIAWAN, <sup>2</sup>MOKH. HENDAYUN, <sup>3</sup>SUCI FITRI YANTI

<sup>1</sup> Informatics Program, Faculty Engineering, Langlangbuana University, Bandung, Indonesia

<sup>2</sup> Informatics Program, Faculty Engineering, Langlangbuana University, Bandung, Indonesia

<sup>3</sup> Informatics Program, Faculty Engineering, Langlangbuana University, Bandung, Indonesia

Email: <sup>1</sup>awans2425@gmail.com, <sup>2</sup>hendayun@aol.de, <sup>3</sup>suci.v3.yanti@gmail.com

## ABSTRACT

Along with the development of the Internet, many system have been built that operates in real-time and online, which allows one to access data from anywhere and get the latest information. One system, that is used to provide data services are the portals. Portal is a medium that is used to represent complex information through the Internet in an integrated way. Single Sign On (SSO) is a method to incorporate web applications with the aim of combining the existing application into a site called Web Portal. With the Web Portal using Single Sign On (SSO) with OAuth method, meaning each user only needs to have one username, one password. If you want to get the service in the Web portal, the user only needs to login once be able to use all of the services of existing applications in the Web portal. It can also facilitate in organizing existing user data, so that the security of user data is more secure, because using a centralized storage of user data.

**Keywords:** *Single Sign On, SSO, OAUTH Method, Web Portal*

## 1 INTRODUCTION

### 1.1 Backgrounds

Most of the services from higher institution to its academic members are offered partially or are not using an integrated application service. The most common service applications for higher institution are Academic Information System, Library Information System, and other information systems. Managing these systems are still a difficult task due to every user has different username and login ID for each system. Every user need to memorize too many usernames and passwords. Therefore, a portal for integrated system and manage all authentication process is required. The authentication process in an integrated system needs an additional system which acts as a connector between integrator system and service application system. This system handles all authenticating processes in each service application system and known as Single Sign-On (SSO) [4,5, 7]. SSO is a mechanism of centralized authenticating system which lets user to access all applications and other services with only one authenticating process

[1,5,7]. User will only need to memorize one username and password to get into every service. Langlangbuana University Bandung (UNLA) has several applications to serve it academic members. However, each application still runs in its own way and not integrated yet. Having that said, author is challenged to apply this system into UNLA's Service Application System.

### 1.2 Research Questions

The research questions in this research are as follow:

1. How to integrate several applications with different username logins and passwords?
2. How to manage data in each applications to build an integrated system?
3. How to make the data management easier for students and to avoid data inconsistencies?
4. How to manage data centrally?

Problem limitations in the development process of this application are as follow:



1. Portal System will be designed on web based under the JSON (Javascript Object Notation) Standard which works as a format of data exchange, as well as XML.
2. Data Exchange only valid for login access, member data, and member report.
3. MYSQL database and PHP Programming Language will be utilized.
4. There would be 3 systems, which are Portal Web, Library Web, and Assessment Web, to be utilized to try the data integration process.
5. Share Data Concept using modified Oauth method to enable to have its own Class function.

Objectives and Benefits of this research are as follow:

1. To facilitate easier access for user in using different applications with one authenticating process (data verification).
2. To enable easier data exchange or integration between applications.
3. To simplify user data management by using a centralized database.

## 2 RESEARCH METHODOLOGY

### 2.1. Eliciting the Software Specification

During this stage, a series of interviews to user of Portal Web in Faculty of Technology UNLA will be conducted. A list of interview questions have been prepared in order to reveal what requirements are needed by using SSO [5]. Therefore, output of this stage is the series of answer to be analyzed and the result will serve as reference to create a document on Software Required Specification (SRS) [2].

### 2.2 Designing the Software

The input for this stage is requirements from user in form of SRS document, based on defining stage of software requirements. The software design process will include database design, interface design, and system design by translating software requirement specifications to UML design. The output of this stage would be an UML Diagrams, which includes: Usecase Diagram, Activity Diagram, Sequence

Diagram, and Class Diagram. All of those diagrams are the main part of design document.

### 2.3. Implementing Design

This stage will deliver the beta version of the software, which is tested with black-box method. Software testing is used mainly to ensure that all functions running well according to the designs made in the previous stage. The output of this stage is a code which is corresponding to the design of the software.

## 3 BIBLIOGRAPHY/SCHOLARLY RESEARCH

### 3.1 Single Sign On (SSO)

Single Sign On (SSO) technology is a technology which lets network user to access all resources inside the network with only one user account [1,5,7]. This technology is highly in demand, especially in a very broad and heterogenic network (where operating system and applications used in a computer are facilitated by many vendors, and users are asked to fill information in each of different platform they are intended to use). With SSO, a user will only need to do one authenticating process to gain access to all service in the network.

### 3.2 OAUTH Method

OAuth is an open protocol which lets users to share their personal resources (e.q. pictures, videos, list of addresses) which are saved in a particular web to another site without any username and password necessary. This process is done by providing a token, instead of username and password, to access their data which under a particular service provider. Each token gives access to a particular site (e.q. a video editing site), from a specified resource (forexample a video from particular album), and with specified duration (for example, for the next two hours).

OAuth allows a user to authorize a request from third party to access any information stored in other service provider even without share access



authorization nor all their data [8,9]. Its working method is similar to credit card method which asks user to put signature on transaction slip, instead putting ATM Card and its PIN.

**3.3 Unified Modeling Language (UML)**

UML is a visualization of language on object-based software development modeling which illustrates a system in an easily understood and standardized format [10]. It provides a mechanism to simplify communication with other party. Some diagrams related to UML manufacturing are as follow:

- Usecase Diagram  
Usecase is a illustration of process which shows attitude or habit of the system
- Activity Diagram  
Activity Diagram visualizes activity streams in the system on progress. It shows how each stream started, a potential decision, and how it ends. This diagram also show potential parallel process happens in some executions.
- Class Diagram  
Class Diagram shows a structure and description of class, package, and object, along with how it corresponds one to another, such as containment, hereditary, association, etc.
- Statechart Diagram  
Statechart diagram illustrates a transition and changes of condition (from one state to another one) of an object in the system, as a result from received stimuli. Generally, statechart diagram shows a particular class.
- Sequence Diagram  
Sequence Diagram shows interaction between objects inside and around the system (including user, display, etc) in a form of message towards time. Sequence diagram consist of vertical dimension (time) and horizontal dimension (related objects)
- Collaboration Diagram  
Collaboration diagram also illustrates interaction between objects as well as sequence diagram, but this diagram focuses more to the role of each object instead of message delivering time.

**4 RESULT AND DISCUSSION**

**3.1 Requirements Analysis**

The expected requirement for the web portal is the ability to:

1. Do a Single Sign On and share session in multiple subdomain. Therefore, when we open application in a web portal subdomain, there will be no login required.
2. Give Access Authorization (Public Key and Private Key) to the third party (another application which would be processed under SSO)
3. Provide students data and information to authenticated subdomain.

**3.2 Functional Requirement**

Functional Requirement will give details of all main features of application system and are as follow:

*Table 1: System Functional Requirements*

Code	Description of Requirements	Information
01	Web Service Management Process	Web Service Management process by Web Portal admin in registering web client to do SSO or member data communication
02	SSO Login Process	Login process is done by students when they enter web portal page
03	Student data export process	A Process where web client admin take member data from web server to be analyzed in web client
04	Student Data Management	Web portal admin is able to add, edit, or erase student data
05	Department Data Management	Web Portal admin is able to add, edit, or erase department data

**3.3 Application Design**

Based on all requirements stated previously, there is one solution, which is to create a web portal application service to bridge many applications in sharing their data. A modified OAuth technology will be utilized in building a web portal, in order to simplify SSO Login checking, which will result in JSON as a data exchange format.

In this research, there would be 3 applications used, which are web portal (as a data exchange web server and SSO), Library Application (web client) and Assessment Application (web client). Web server application in the web portal will run under function of response upon request from web client. Web client application which is located in Library App and Assessment App will have task to call the functions that already provided by web server application. The data that will be utilized as SSO is student data which is located in web server database. If login is successfully done, there would be no need to log into another web client application. Later on, when web client has authority to take student data from web server, this web server will provide member data requested by web client. The application design consists of two designs, which are:

1. Server Application Design.

Server application is design to provide several functions. These functions will be requested by client application to be executed. There are two main functions to be designed:

a. User Checking Function

This function will do a preliminary check to appID and appKunci which are given by server to client at registration process in web service. Registration is used as a method of OAuth which provides Public Key and Private Key to a third party (client), which will be authenticated later. If URL, appID, and appKunci from the client is suitable with the data saved in the server, then client will be able to continue to further function. If it is not, then the authorized access will be disconnected.

b. Login Function

This function will be enabled only after a client is authenticated when it is being checked in CekUser function. Client will gain access to get member data in server application. Member data will be adaptable to client's requirement, whether client wants it to be saved in client database, or just to be shown upon access. However, client is not authorized to delete any data in the server.

2. Client Application Design

Client application works to check a service provided in the web portal (server). Client application is intended for user who wants to access web portal. User will request to web client application through internet browser, and then the request will be sent through accessing functions in web portal application. Afterwards, data will received once more by web client in JSON format.

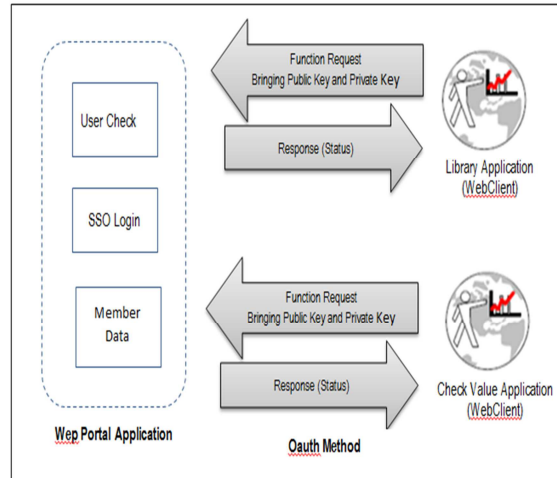


Figure 1: Sistem Design

3.4 Business Process Modeling

According to analyzed problems, author tries to approach business process modeling. Author presents a business model in Business Use Case Diagram, completed with Object Model and Activity Diagram.

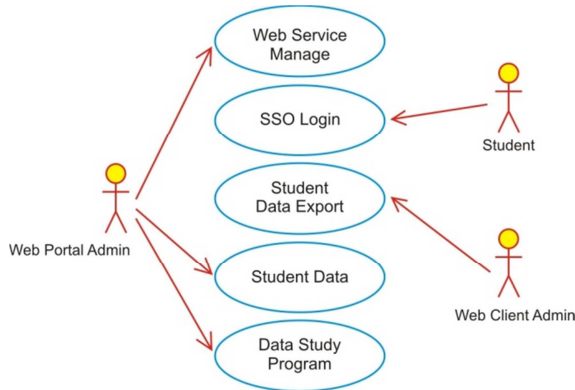


Figure 2: Business Use Case Diagram



Figure 3: Use Case Diagram

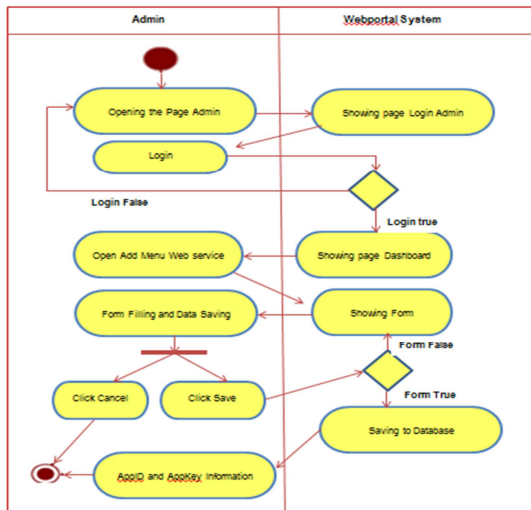


Figure 4: Activity Diagram with Web Service

## 5 IMPLEMENTATION AND EXAMINATION

### 5.1 Software Requirements

Table 2: Software Requirements

No	Software	Information
1	Operating System	Windows XP SP 2
2	Programming Language	PHP
3	Web Server	XAMPP
4	Database Server	MySQL
5	Web Browser	Mozilla Firefox
6	Code Editor	Macromedia Dreamweaver CS 3
7	DFD Modeller	Viso 2007

### 5.2 Web Server Configuration

Web Server is a basic application which needs to be configured before being implemented to the system. In this case, Xampp version 2.8 webserver will be utilized. The configuration will include root document laid down from the system, storing log access file, and system security. The configuration is located in apache configuration folder (http.conf) and configured as follows:

```

<VirtualHost *:80>
DocumentRoot C:/Apache/www/Lit_portal/
ServerName portal.net
</VirtualHost>
<Directory "C:/Apache/www/Lit_portal">
Options Indexes FollowSymLinks Includes
ExecCGI
AllowOverride All
Order allow,deny
Allow from all
</Directory>

<VirtualHost *:80>
DocumentRoot C:/Apache/www/Lit_nilaionline/
ServerName nilaionline.portal.net
</VirtualHost>
<VirtualHost *:80>
DocumentRoot C:/Apache/www/Lit_perpus/
ServerName perpus.portal.net
</VirtualHost>
    
```

After Apache configuration and host host (if windows server is used) settings, open the file which is located in

file:\\Windows\System32\drivers\etc\hosts; and add

the host:

127.0.0.1 nilaionline.portal.net

127.0.0.1 perpus.portal.net

127.0.0.1 portal.net

Name	Date modified	Type	Size
komponen	1/21/2015 8:44 PM	File folder	
librari	1/21/2015 8:43 PM	File folder	
manager	1/21/2015 8:49 PM	File folder	
plugin	1/21/2015 8:50 PM	File folder	
setingan	1/21/2015 8:52 PM	File folder	
template	1/21/2015 8:45 PM	File folder	
templates_c	1/21/2015 8:45 PM	File folder	
.htaccess	2/1/2013 11:27 PM	HTACCESS File	1 KB
index	1/27/2013 8:36 PM	PHP File	3 KB
inoph	12/22/2012 11:19 ...	PHP File	1 KB

Figure 5: System Design

### 5.3 Database Implementation

Database building is done by means of DBMS MySQL application

Name	Date modified	Type	Size
web_nilaionline	1/21/2015 8:45 PM	File folder	
web_perpus	1/21/2015 8:45 PM	File folder	
web_portal	1/21/2015 8:45 PM	File folder	
web_nilaionline.sql	6/3/2014 10:55 AM	SQL File	919 KB
web_perpus.sql	6/3/2014 10:56 AM	SQL File	914 KB
web_portal.sql	6/3/2014 10:56 AM	SQL File	919 KB

Figure 6: Database Structure

### 5.4 Interface Implementation

In order to implement this application, a following interface implementation is used

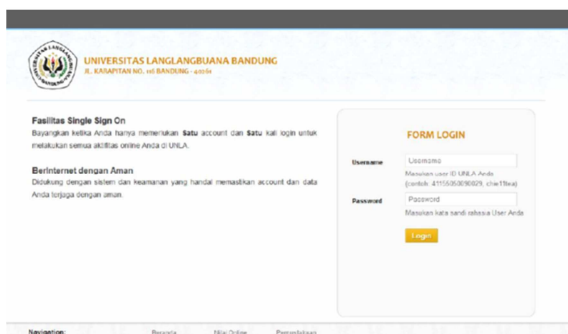


Figure 7: Main page display

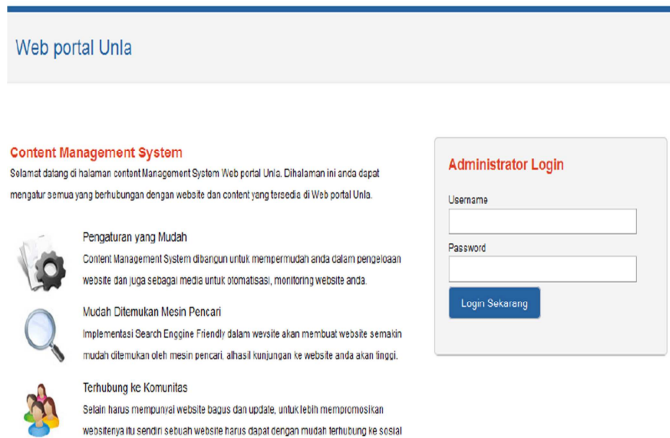


Figure 8: Page display after web portal login

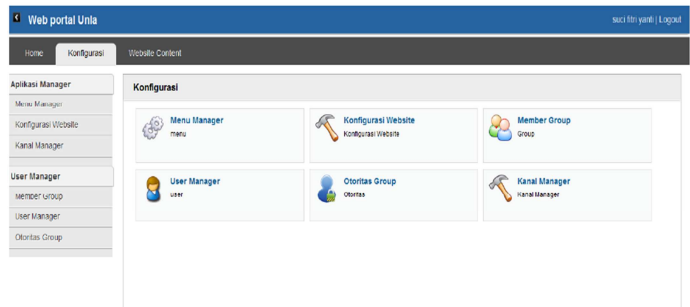


Figure 9: Page display after admin web portal login

## 6 TESTING RESULT

Based on the result of overall testing of the system, it is concluded that this application has already passed improvement stage and already optimized towards above processes. Functionally, system works according to expected result.

Table 3: Login Trial as Administrator

Case and Examination Result			
Input	Expectation	Observation	Conclusion
Username & Password	Shown in username edit box	Username login and password can be filled in the edit box field, as expected	Accepted
Click on Submit button	Username and Password data are taken from cmsmanager table	Login button functions as expected	Accepted



Table 4: Examination on data user analysis

Case and Examination Result			
Input	Expectation	Observation	Conclusion
Login Data	Page after login process is shown	Username login and password can be filled in the edit box field, as expected	Accepted
Click on Configuration Menu	Submenu from configuration menu is shown	Submenu from configuration menu functions well	Accepted
Click on User Manager menu	Administration Manager Page, which is a list of member data, is shown	Edit, delete, and add member menu, along with authorization menu, functions well as expected.	Accepted

Table 5: Examination on Web Service Data Analysis

Case and Examination Result			
Input	Expectation	Observation	Conclusion
Login Data	Page after login process is shown	Username login and password can be filled in the edit box field, as expected	Accepted
Click on Website Content Menu	Submenu from Webservice Content menu is shown	Submenu from Website Content menu functions well	Accepted
Click on User Web Service menu	Web Service User Manager Page, which is a list of member data, is shown	Edit, delete, and add member menu, along with authorization menu, functions well as expected.	Accepted

Table 6: Examination on Data Import

Case and Examination Result			
Input	Expectation	Observation	Conclusion
Login Data	Page after login process is shown	Username login and password can be filled in the edit box field, as expected	Accepted
Click on Website Content Menu	Submenu from Webservice Content menu is shown	Submenu from Website Content menu functions well	Accepted

Table 7: Examination on SSO Login

Case and Examination Result			
Input	Expectation	Observation	Conclusion
Username and Password	Shown in username edit box and shown in password edit box	Username login and password can be filled in the edit box field, as expected	Accepted
Click on Library Website URL	A page after login will be shown without do a re-login	After login, student doesn't need to do a re-login. Student is able to download available e-books.	Accepted
Click on nilaonline website URL	A page after login will be shown without do a re-login	After login, student doesn't need to do a re-login. Student is able to check grades online.	Accepted
Click on student menu	Web Service User Manager Page, which is data user list, is shown	Import data menu functions well, as expected.	Accepted

## REFERENCES

- [1]. Awan Setiawan (2012), Development on an Identity Management System using SSO With The Central Authentication Service Methods, Proceeding KNASTIK2012, Universitas Kristen Dutawacana, ISBN 978-602-95792-0-8. Page 59-68
- [2]. Pressman, R. (2001), *Software Engineering A Practioners Approach*, 5<sup>th</sup> Edition. McGraw Hill, Newyork.
- [3]. Raymond Philip Causton (2002), Smardcard usage for Authentication in Web Sign Sign on System, Helsinki University of Technology.
- [4]. Helge Wiemann (2007), Identity Management.
- [5]. Brian Ricardson (2005), an Architecture for Identity Management, University of Sascatchewan.
- [6]. Sri Dharwanti (2003), Intoduction to Unified Modeling Language (UML).
- [7]. Yuchen Zhou David Evans (2014), SSOScan: Automated Testing of Web Applications for Single Sign-On Vulnerabilities, In 23rd USENIX Security Symposium, San Diego.
- [8]. Eric Chen, Yutang Pei, Shuo Chen, Robert Kotcher, Patrick Tague, OAuth Demystified for Mobile Application Developers, <http://research.microsoft.com/pubs/231728/OAuthDemystified.pdf>.
- [9]. San-tsai Sun and Konstantin Beznosoft (2012), The Devil is in the (Implementation) Details: An Empirical Analysis of OAuth SSO Systems.
- [10]. Howard Podeswa (2005), UML for the IT Business Analyst: A Practical Guide to Object-oriented Requirements Gathering, Thomson Course Technology PTR All Rights Reversed.