

## Development of Integrated Library System: A Case Study of TRAMPIL foundation 's Learning Center

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### Graphical abstract

### Abstract

TRAMPIL Foundation is a social foundation that is engaged in the education field by providing learning facilities for public in Surabaya, especially for teachers or educators to improve their teaching quality. The Foundation established the learning centers are spread all over Indonesia to provide the learning facilities for people in the rural area. The learning center sets up the library and under supervises by the foundation in Surabaya.

In this study, we will develop a system to integrate collection data of each learning center. This system is expected may help the librarian to manage and distribute the information of both physical and digital collections. This system is also able to help librarian for monitoring the system usage therefore that it can be used as an evaluation of the development of learning centers. The system is implemented in web technology using Yii framework.

Based on a questionnaire given to the system stakeholders, 100% assess the software meets the library business' needs and present accurate data. 100% of respondents measure the overall software is high.

*Keywords:* Library System, Yii Framework, learning center, library collection, library management

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## 1.0 INTRODUCTION

TRAMPIL Foundation is a social foundation that is engaged in the education field by providing learning facilities for public in Surabaya, especially for teachers or educators to improve their teaching quality. The Foundation established the learning centers are spread all over Indonesia to provide the learning facilities for people in the rural area. As for now, the learning center sets up the library and under supervises by the foundation in Surabaya. The learning centers will provide information and libraries' collection both in physical collection (such books, CDs, maps etc.) and digital collection. These collections will be shared between learning center to distribute information widely and quickly (especially digital collection). The library system sharing is the ability to dramatically improve resource-sharing between libraries. This system holds requests and transparent access to multiple library catalogs makes it as easy as it can be for libraries to share their material.

Shared systems allow individual library collections to be represented in a single system. With robust Internet connection, public and library patrons can more easily discover what other libraries' collections offer. Not only discovery is enhanced, but patron initiated holds (based on patron authentication information)

can expedite access to and delivery of the discovered resources [1].

Advancements in software technologies and, especially, Internet technologies have created more sophisticated systems, and more demanding users. Technological and Internet advances have also made some things easier. For example, it is no longer necessary to purchase, install, and manage multiple servers and applications. Therefore, the people managing library also need to be more sophisticated. When properly administered, these integrated systems provide libraries opportunities to creatively mash-up solutions that greatly improve the experience for the library patron as well as librarian [2].

In this research, we will develop a system to integrate collection data of each learning center. This system is expected may help the librarian to manage and distribute the information of both physical and digital collections. This system is also able to help librarian for monitoring the system usage therefore that it can be used as an evaluation of the development of learning centers. The system is implemented in web technology using Yii framework.

## 2.0 LITERATURE REVIEW

## 2.1 Library Management System

Library management system is used to describe the software used to manage library inventory, keep track of patrons, and to manage circulation. It provides the core functionality for running a library including cataloging, online public access catalog (OPAC) and circulation functions. The potential benefits of sharing a library system are numerous. Some libraries will significantly reduce their costs. For a few, the cost may go up but this can be addressed by buying hardware and operational cost for Internet connection. Therefore, the operational costs will be reduced because the IT staff can be reduced or eliminated at each library. In terms of direct savings, the library can take advantage of library's materials budget limitation to purposely purchase significant and popular items based on its priorities. Moreover, rather than buy the same titles, each library buys different and less common titles so that patrons more often find – in the catalog -- exactly what they are looking for. The quality of the collection will improve as many more copies of popular titles, and possibly more format choices become available and less common titles are added. The result is undoubtedly a more robust and diverse collection. The patron experience will be enhanced because of the ease of access, quick service for requested items and the range of material available. State-of-the-art shared systems utilize scoping and faceting to help patrons search for, select, and get exactly what they want. Many shared systems have an option to scope searches so that, by default, the patron's initial search is for material in their local library [2].

## 2.2 Library collection

The focus on the collection as the defining characteristic of a library has continued into the digital age. Thus the continually updated Online Dictionary for Library and Information Science [3] defines a library as ‘A collection or group of collections of books and/or other print or non-print materials organized and maintained for use (reading, consultation, study, research, etc.)’ and then elaborates the definition by explaining that ‘Institutional libraries, organized to facilitate access by a specific clientele, are staffed by librarians and other personnel trained to provide services to meet user needs.’ Based on definition above, there are two type of collection first is print materials and the second is non print material. The print materials is known as physical collection, meanwhile the non-print material is known as digital collection.

In practice, the term “digital library” is generally used synonymously with the term “digital collection,” to describe any aggregation of electronic materials, whatever the format, and whatever the electronic materials’ relationship to physical materials. There are, at present, few exclusively electronic collections (that is, with no corresponding physical collection), and moreover, electronic collections based on physical collections are referred to as digital libraries. The definition of the term digital library that will be employed in this research is just this: a digital library is any collection of electronic resources, to which a patron can gain access electronically. A digital library may therefore be exclusively electronic, with no physical counterpart, or it may be a digital supplement to or extension of a physical library or library collection [4].

## 2.3 Cataloguing

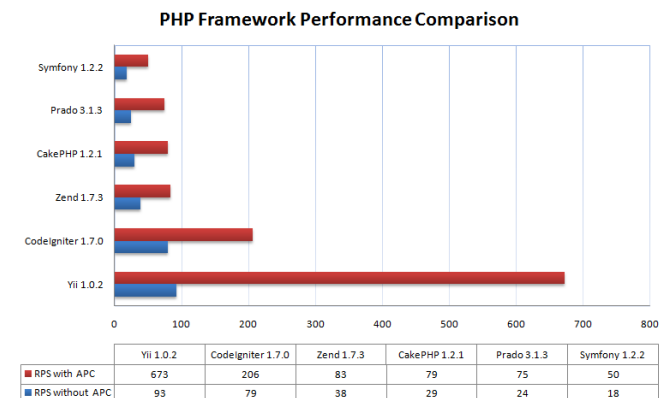
Every collection must be described using a standard format. This process is known as cataloguing. The same basic components are contained in each. Commonly, the cataloguing provided data by the author’s name, the title of an item, and the subject(s) covered in the item. The additional data were additional authors, names of series, illustrators, and sometimes abstract, collection’s picture cover, etc. This standardization of procedures enhances the exchange of bibliographic data and is essential in computerized systems.

## 2.4 Online Public Access Catalogue (OPAC)

An Online Public Access Catalogue (often abbreviated as OPAC or simply Library Catalogue) is an online database of all of the resources or collection held by a library or group of libraries. It is a computerized library catalog available to the public. Most OPACs are accessible over the Internet to users all over the world. Users search a library catalog principally to locate books and other material physically located at a library (OPAC). When an OPAC contains data from various libraries, it is known as Union Catalogue.

## 2.5 Yii Framework

The name Yii is an acronym for “Yes, it is”, and is pronounced as Yee or (ji:). Yii is a high-performance, component-based, web application framework written in PHP5. It is an open source application, which is created for quick development. The name is also representative of the adjectives most used to describe it, such as easy, efficient, and extensible. In Yii, all code can be personalized for specific requirements. Yii Framework is also tested to be the most efficient framework in autumn 2012, as seen in Fig. 1. This proves that Yii is a very powerful framework. [5,6].



**Figure 1** PHP Framework Performance Comparison [6]

Yii is implemented with a module called “gii” which is an automatic code generator that makes possible to create models, modules, forms, CRUD’s and controllers without any coding [7]. CRUD comes from the words create, read, update, delete. It is a programming class that is implemented with methods that create, read, update and delete data from a database [8].

Yii has a commonly used planning model called model-view-controller (MVC). The MVC is a design pattern, which is widely adopted in Web programming. MVC aims to separate business logic from user interface considerations, so that developers can more easily change each part without affecting the other. In MVC,

the model represents the information (the data), the business rules and the logic of data processing; the view contains elements of the user interface such as text, form inputs; and the controller manages the communication between the model and the view [9]. The controller ties information and transports information between all components.

Yii Framework has also a front-controller which collects particular info about a user request. The Yii's front-controller summarizes the execution context; thus the request could be processed. The application sends the user request forward into a suitable controller for further processing [9]. The structure of Yii application can be seen at Fig. 2.

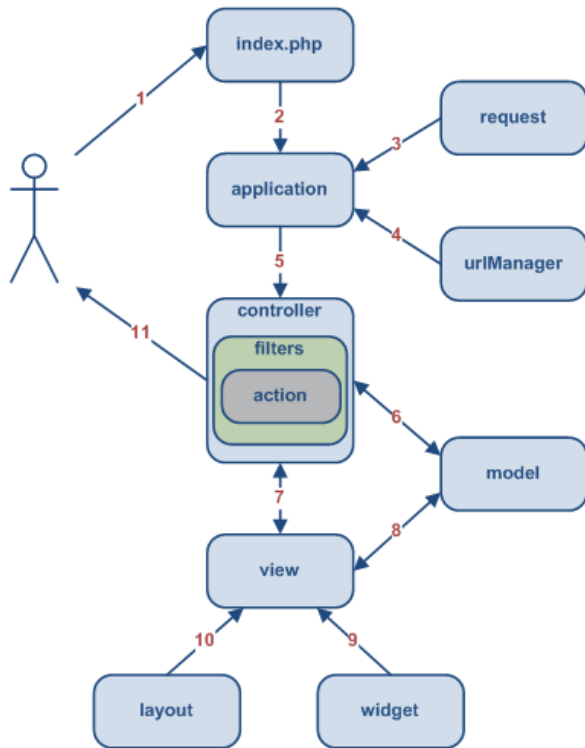


Figure 2 Typical workflow of a Yii application [9]

### 3.0 LIBRARY SYSTEM SPESIFICATION

The library system needs to store information pertaining to its patron, librarian, the physical locations of its learning center, and the collection in those locations. In this research, it has decided to limit the collection to two types: physical and digital collection.

The library must keep track of the status of each collection: its bibliographic data, location, and status. In order to allow multiple copies of the same physical collection, each item will have a unique accession number.

Library patron will provide their name, address, phone number, and date of birth. They will then be assigned a unique user name and ID number, plus a temporary password that will have to be changed when they sign in for the first time.

The learning center will have physical locations. Each learning center will be identified by name, address and a phone number. Additionally, a learning center will store its staff data (librarian).

From the anticipated information needs of the intended system, the following core specification was derived:

- Online Public Access Catalogue (OPAC) as a union catalog that consist of library collection from various learning centers. The features are:
  - Library collection searching
  - Searching of learning centers' collection
  - Provide registration feature of library patron. Library patron can give a review and rating for collection, and download digital collection.
- Online digital collection cataloguing
  - Dublin Core standard
  - Ability to link to hosted online documents in a range of formats (mpeg, avi, mp4, and pdf)
  - Authorized access to the digital collection (open, limited, and restricted)
- Dashboard and dynamic report for library system monitoring. This feature will help librarian to observe the collection usage.
- Dashboard for system performance monitoring. This feature will help IT staff to monitor the system performance and usage.

The detail features based on the system actor can be divided into four categories.

Functions for public or guest:

- View the collection
- Search the collection
- Do the registration

Functions for library member:

- View the collection
- Search the collection
- Provide a review to the collection
- Provide a collection rating
- Download the digital collection

Functions for learning center librarian:

- Maintain the publisher data (name, address, etc.)
- Maintain the learning center data (address, phone number, its staff)
- Maintain the collection subject data
- Maintain the language data
- Maintain the bibliographic data or cataloguing
- Maintain the digital collection files
- Generate report
- Monitoring function

Functions for librarian (foundation):

- All function of learning center librarian
- Generate completed report (for all learning center)
- Monitoring function (for the integrated library system)

The use case of the system can be seen in Fig. 3.

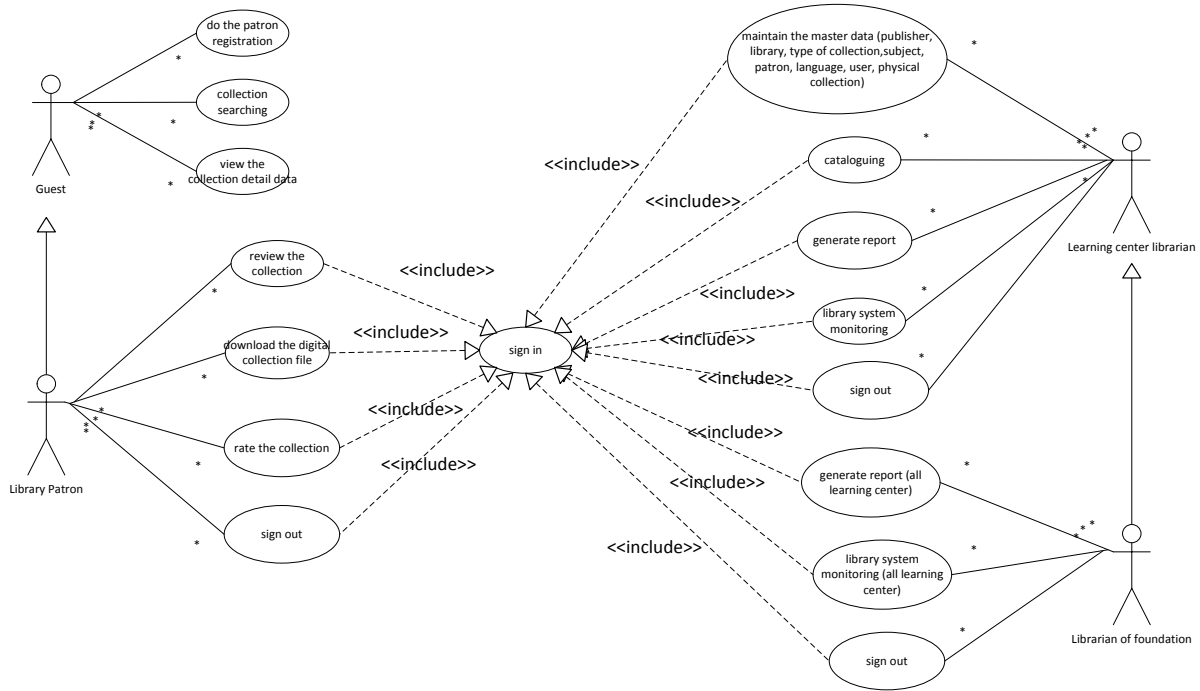


Figure 3 Use Case of Library System

#### 4.0 IMPLEMENTATION

The first page of the homepage is called index.php which is Online Public Access Catalogue (OPAC). The page provided users with opportunity to search collection. This system provides searching for physical and digital collection. The other feature of OPAC is directory that shows all the collection based on their subject. The OPAC interface can be seen at Fig.4. The system also provide refine search. Refining the results allows web visitor to identify exactly the items.

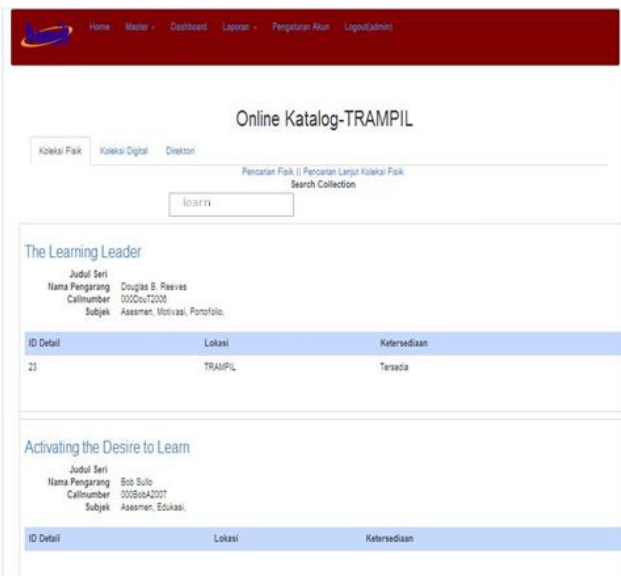


Figure 4 Online Public Access Catalogue

In Yii Framework, authentication is typically done with a username and a password, which is the normal procedure in web applications. This research used Authentication and User

management provided by Yii extensions. The extension called "yii-user" helps that a database can be used for authentication [10]. User permissions is set by "rights" extension [6]. Password encrypting is done by "phpass", a portable PHP password hashing framework, which is being used e.g. in WordPress. Phpass is a hashing framework that hashes passwords to make them secure from invaders [11]. The sign in or log in page can be seen in Fig. 5

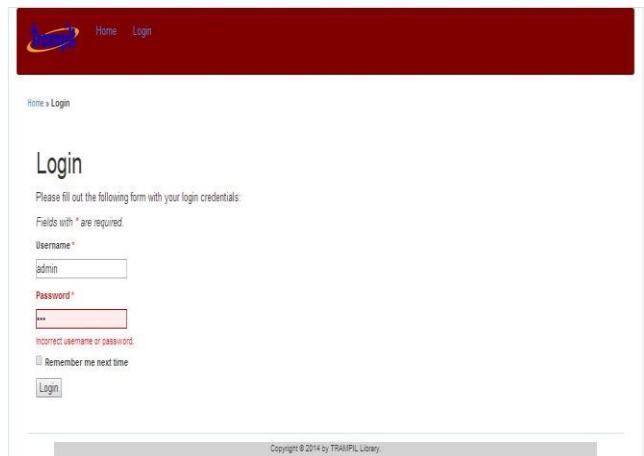


Figure 5 Login interface

In order to accept a user table information and URL parameters, the global variables \$\_POST and \$\_GET were predefined. PHP regular expressions were used to determine whether the user's input tallies with the requirements or not. Session was used to keep the user's login information after detecting user logs. The main function was divided into three parts: user registration, user log in and user log out.

The user registration has four main features which are to:

- fill out the registration information form and JavaScript detect the in registration information entered by the user
- check the registration information by registration processing module
- detect whether the username was already exist or not
- write the user's information into the database, registration is successful.

The main features of user sign in or log in are:

- JavaScript detects the initial login information entered by the user in the login form interface.
- The Login module checks the user's input according to the information located in the database server.
- If the information is correct, the user will be notified of successful login and set to login state (session).
- If the information is wrong, the user will be notified of login failure and would need to sign in again.

The session will be canceled unconditionally if the user logs out. When the user log in to the system, the session opens a unique session ID to identify the user. The session ID would be either stored within the cookie on the user's computer or passed through the URL.

In digital collection cataloguing module, librarian input the metadata of digital collection based on Dublin Core standard. Cataloguing marks an important note which is to be subject to continued closures and access restrictions are identified. The metadata based on Dublin core standard is built as data model and the interface for cataloguing module can be seen in Fig. 6.

Figure 6 Digital collection cataloguing

Dashboards feature provided browser-based easy to access, collaborate, analyze and compare all your critical information in one interface. The information that librarian can expect to track via a dashboard can include the performance of your website. In this system, dashboard used to monitor the favorite collection (based on downloaded number) and also displays the catalog site statistics. The dashboard page is shown in Fig. 7.



Figure 7 Dashboard interface

For library patron, they obtain facility to review and rate the collection. The reviews and ratings will be saved to the data store. The review feature help users to share information and to retrieve relevant, high-quality content more efficiently. It allows library patron to write a comment or opinion about the collection. The ratings, which are tags that allow users to assess the value of content against a scale. The rating value is measured by stars which is 5 stars is the maximum value. Rating is calculated by average value of customer rating. User interface for review and rating can be seen in Fig. 8.

Figure 8 Review and rating user interface

Report module is used to display a list of collections. This dynamic report allows the librarian select the data, period and criteria of result as needed. The report module can be seen in the Fig. 9.

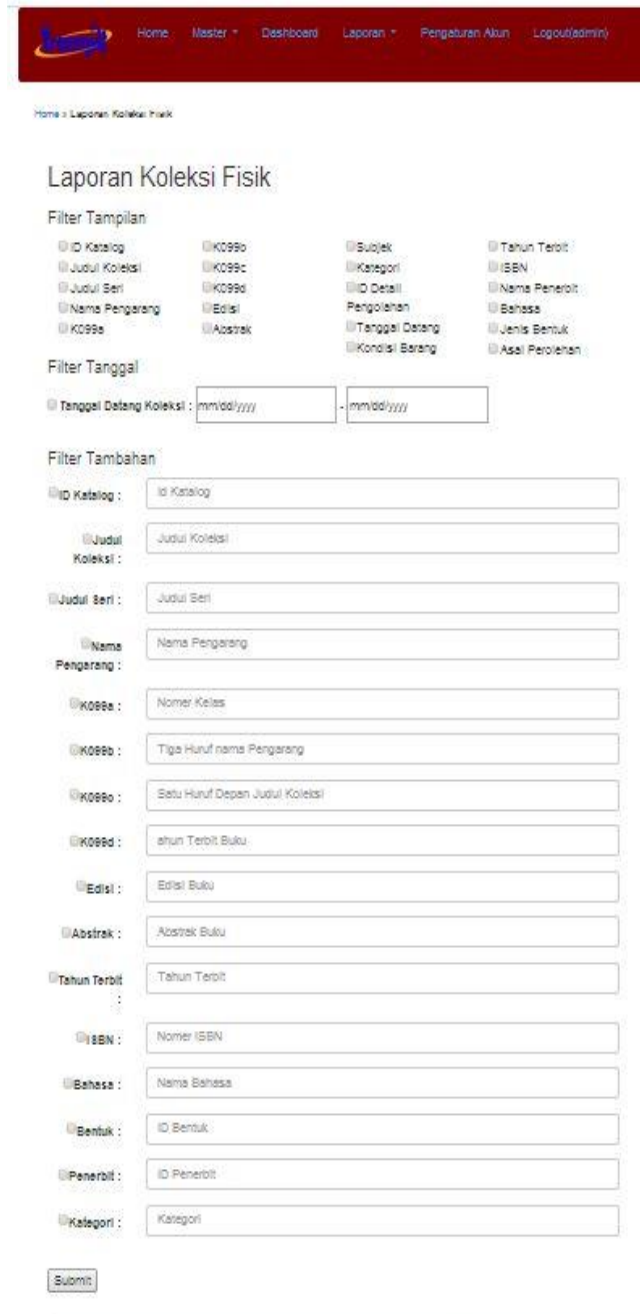


Figure 9 Report module

## 5.0 USER RESPONSE

User response is measured to describe the status, opinion and actual problem from users' point of view in reliable and valid way. The opinion based evaluation method aims to elicit the users' opinions with the questionnaire technique.

In this research, user response results obtained through a questionnaire given to the owner, IT Staff, and Library Consultant of TRAMPIL Foundation. Assessment is done by filling out a questionnaire that contains several indicators such as VH represents very high, H represents high, N represents neutral, L

represents low and VL indicating very low. The results of questionnaire can be seen in Table 1 with 6 respondents.

Table 1 Questionnaire Result

No	Statement	V	L	N	H	VH
		L				
1	User interface	0	0	4	2	0
2	The software meets the business' needs	0	0	0	0	6
3	Software accuracy	0	0	0	0	6
4	Ease to use	0	0	0	4	2
5	Information obtained	0	0	2	4	0
6	The overall software	0	0	0	6	0

## 6.0 CONCLUSION

The main problem met by TRAMPIL foundation when providing learning center for public is system sharing to ameliorate resource-sharing between libraries. With the reliable internet connection allows individual library collections to be represented in a single system. The integrated library system has been designed and implemented for managing a learning center collection with multiple locations, the ability to store digital collection as well as books, and separate functions for library patron and librarians. In a project meeting of integrated library system, the choice of the framework was discussed and Yii Framework was chosen to be used. Yii Framework was completely new for the author, but it looked promising. After much reading and many tutorials the learning of Yii became quite fast and it was possible to do useful software development and testing.

Based on the user response, this software has fulfilled the library business' needs and provide accurate data. This is shown by the fact that 100% of respondents provide positive feedback that the software meets the business' needs and present accurate data. 100% of respondents measure the overall software is high.

## Acknowledgement.

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