# Dashboard of Quantitative Data for Accreditation of Undergraduate Level Study Program using Application Programming Interface (Case Study on University in Indonesia)

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**Abstract.** Higher education accreditation held by the National Accreditation Board (BAN-PT) is one of the parameters in determining the quality of higher education institution in Indonesia. The quality of study-program or department in higher education institution are based on an the assessment of various evidence and documents that are in accordance with the standards provided by BAN-PT; namely self-evaluation and accreditation forms. For the accreditation process, study-program or department in university need to prepare the accreditation forms and reports on their performance over the past 3 to 5 years. Mostly, all data is spread in other information system and different physical documents that require more time and effort to integrate until they are tried. Dashboard of Quantitative Data for Higher Education Accreditation is an application system that is able to automatically retrieve and display the reports and visual results of a study-programs evaluation with more time and effort to save. The development of this dashboard uses an Application Programming Interface (API), which is integrated and connected with Academic Information System in university simultaneously. It is an executive information system that facilitates and supports information and decision making for academic executives (like leaders of study-program, faculty or university). With this system, they can periodically evaluate the internal state of the study program, faculty or university in accordance with the assessment based on BAN PT standards, and then able to improve it in the future.

**Keywords:** Quantitative Dashboard; Executive Information System; Academic Accreditation; Application Programming Language; API; National Accreditation Board

## 1 Introduction

One of the ways to assessing universities in Indonesia is through an accreditation system. The assessment is used as a quality benchmark in all study programs and higher education institutions, both public and private, to hold professional and academic programs. The better the value of accreditation will have an impact on the views of outsiders regarding the quality of the study program and higher education institutions. Decisions regarding quality are based

on an assessment of various evidence and documents prepared by higher education institutions in accordance with the standards provided by BAN-PT, including self-evaluation and accreditation forms, which are used as a basis for assessing a criterion [1].

The corporate world is currently facing problems, namely the swelling of data (big data) due to the successful implementation of various computerized systems [2]. This is also felt by the world of education, especially universities. To prepare accreditation documents / reports for most study programs or colleges, all data is spread on different information systems and physical documents so that it requires more time and effort to integrate until they are assessed. The problem that arises is how to organize all of the scattered and disorganized study program data well so that it is easier to evaluate itself before the assessment period by the national accreditation institution.

Therefore we need a system that is able to automatically retrieve and display visual evaluation results with more time and effort savings, namely the Academic Executive Information System (EIS) that is able to visualize the current state of the study program data that has been collected, processed and simplified. The study is intended to develop an Executive Information System application for academic executives of undergraduate level education, which is in accordance with the BAN-PT accreditation assessment matrix.

This dashboard of quantitative data for accreditation of undergraduate level study program is an executive information system that helps provide data for filling in the instrument for accreditation of study programs in universities and at the same time verification during the visitation process. This application is integrated with the Academic Information System (AIS), case study on The State Islamic University (UIN) Syarif Hidayatullah Jakarta.

## 2   Literature Review

The Executive Information System is a well-visualized form of report for decision making. There are several types of Executive Information Systems [3] suggest 3 types of Dashboard types, 1) Strategic Dashboards, used to support strategic level management to provide information in making business decisions, predicting opportunities, and providing direction for achieving strategic goals ; 2) Tactical Dashboard, focuses on the analysis process to determine the cause of a particular condition or event; 3) Operational Dashboard, which functions as a support for monitoring of specific business process activities. Focus on monitoring activities and events that don't change constantly.

The Higher Education National Accreditation Board is one of the accreditation assessment bodies in accordance with Law number 20 of 2010 which specifically deals with the assessment of tertiary education accreditation. Higher education accreditation is carried out by experts, experts, or experts and those who understand how to assess the management of study programs / tertiary institutions as a Team or Assessment / Assesor Group [1].

Assessment of the quality of higher education is based on some evidence such as documents related to standards agreed upon by a team of experts who master the quality of higher education. Some things that become BAN-PT's assessment standards in assessing the quality of a study program / higher educ/d'[ation institution are [4] .:
1. Standards 1. Vision, Mission, Goals and Objectives, and Achievement Strategies
2. Standards 2. Governance, Leadership, Management Systems, and Quality Assurance
3. Standards 3. Students and Graduates
4. Standards 4. Human Resources

5. Standards 5. Curriculum, Academic, and Academic Environment
6. Standards 6. Financing, Facilities and Infrastructure, and information system
7. Standards 7. Research, Public Service, and Join Cooperation.

The API stands for Application Programming Interface, and allows developers to integrate two parts of an application or with different applications simultaneously. API consists of various elements such as functions, protocols, and other tools that allow developers to create applications. The purpose of using API is to accelerate the development process by providing a separate function so that developers do not need to create similar features. The application of the API will be felt if the desired feature is very complex, it certainly takes time to make something similar to it. For example: integration with a payment gateway. There are various types of system APIs that can be used, including operating systems, libraries and web [5]. The API is a technology to facilitate the exchange of information or data between two or more software applications [6].

## 3 Research Method

This research begins with conducting a preliminary study with literature studies, reviewing the results of prior research, and reading group discussion forums in this field. for system development methods, researchers use Rapid Application Development Method (RAD). RAD is an object-oriented approach to system development that includes a method of software development [7]. The research framework is shown in Figure 2.
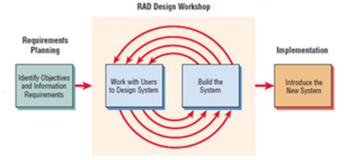


**Figure 1.** RAD phase

This research begins with the preliminary study stage which consists of 3 stages, namely, literature study, review of the results of previous research and reading a forum group discussion related to the research topic. In the literature study stage, researchers collected literature that discussed executive information systems, dashboards and academic information systems. the stage carried out after conducting a literature study was reviewing the results of previous research, at this stage researchers collected the results of previous studies to be able to find out the development and comparison of each study. Then at the stage of forum group discussion, researchers obtained information related to the research topic in depth then collected the data needed in the study

In the first RAD phase, namely requirements planning, researchers identify and analyze the system and sort out the data and information needed to develop the system. After that, planning regarding the requirements of the system needs is done, this planning includes how

the development will be carried out on the system, what kind of system will be made, and also how to apply the appropriate system. This phase produces an analysis of system development and determine the system requirements obtained from the results of studying the academic information system that runs at university and reviewing the forms of study programs from National Accreditation Board

Then in the RAD Design Workshop phase, researchers designed the appearance of the dashboard and the design of the application menu and user interface.

And last in the implementation phase, coding was carried out and using Application Programming Interface (API) for the development of a dashboard system in which the system was integrated with the academic information system.
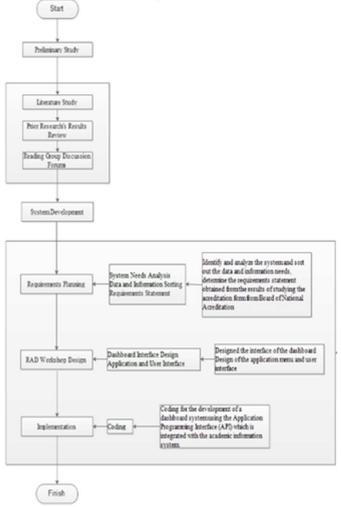


**Figure 2.** Research Framework

# 4   Result

## 4.1 Generated Data from API Link

Figure 3 is an example of data generated from the API link with certain parameters, about lecturer data from the Information study program at the university. In this example, at the end of the URL, there is code 51 which explains the Information System study program code on the API link:

https://api.uinjkt.ac.id/ais/resources/akreditasi/dosen_tetap_sesuai_bidang/51.

The API is created with code by retrieving data from a database and then it is generated in the XML or JSON format. The API is made in the aim of applications can be integrated directly with the database, and application development can be done in any programming language.



**Figure 3.** The data sample that generated from API

In Figure 4, there is a curl_data function which is useful for translating data from the API link so that it can be made into a view, which will be displayed in the view of application form of the study program.
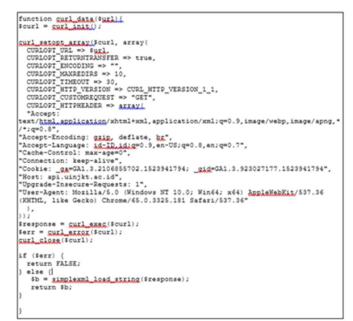
```
function curl_data($url){
$curl = curl_init();

curl_setopt_array($curl, array(
  CURLOPT_URL => $url,
  CURLOPT_RETURNTRANSFER => true,
  CURLOPT_ENCODING => "",
  CURLOPT_MAXREDIRS => 10,
  CURLOPT_TIMEOUT => 30,
  CURLOPT_HTTP_VERSION => CURL_HTTP_VERSION_1_1,
  CURLOPT_CUSTOMREQUEST => "GET",
  CURLOPT_HTTPHEADER => array(
  "Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*
/*;q=0.8",
"Accept-Encoding: gzip, deflate, br",
"Accept-Language: id-ID,id;q=0.9,en-US;q=0.8,en;q=0.7",
"Cache-Control: max-age=0",
"Connection: keep-alive",
"Cookie: _ga=GA1.3.2106855702.1523941794; _gid=GA1.3.923027177.1523941794",
"Host: api.uinjkt.ac.id",
"Upgrade-Insecure-Requests: 1",
"User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36
(KHTML, like Gecko) Chrome/65.0.3325.181 Safari/537.36"
  ),
));
$response = curl_exec($curl);
$err = curl_error($curl);
curl_close($curl);

if ($err) {
  return FALSE;
} else {
    $b = simplexml_load_string($response);
    return $b;
}

}
```

**Figure 4.** The function for translating data from the API link

## 4.2 Data Retrieval from The API Link

The following is an example function of the code to retrieve data from the API link. Data is taken from the API link that corresponds to its needs. The data taken is lecturer data. The code function can be seen in figure 5.

```
function dosentetap(){

        $data = array();
        $data['title'] = "4.3.1 Data Dosen Tetap Yang Bidang Keahlianya
Sesuai dengan Bidang Program Studi";
        $url = REST_API."akreditasi/dosen_tetap_sesuai_bidang/".$this-
>session->userdata('id_prodi');
    //    $xml = file_get_contents($url);
        //$xml = json_decode($xml);
        $dd = curl_data($url);
        $xml = "";
        if(!$dd){
            $data['isi'] = FALSE;
        }else{
            $data['isi'] = TRUE;
            $xml = $dd;
        }
        $data['data'] = $xml;
        $data['ts'] = $_SESSION['tahun'];
        if($_SESSION['jenjang'] == 1){
        $data['content'] = "pages/standar4/dosentetap";
        $this->load->view('dashboard',$data);
        }else{
        $data['content'] = "pasca/standar4/dosentetap";
        $this->load->view('homev2',$data);
        }

    }
```

**Figure 5.** Code function for lecturer data retrieval

### 4.3 Application Interface Result

The following is the result of the application display. Not all functions are displayed, only a few functions. As in Figure 5 which is the main page interface, where the user is required to choose the desired faculty and study program then the system will provide a notification when it has successfully entered the dashboard system.



**Figure 6.** Main page interface

After successfully entering the dashboard system, then the welcome page interface will appear. in this interface, there is a menu on the left and content on the right, content includes existing standards accredited by the study program form, starting from standard 1 to standard 7. The menu has several other sub-menus. The welcome page interface can be seen in Figure 6.



**Figure 7.** Welcome page interface

Then, in the Figure 7 we can see the permanent lecture whose expertise is in accordance with the study program in Universisty page interface. The data contained on this page are included in standard 4 in the study program form.

**Figure 8.** The permanent lecture whose expertise isi in accordance with the study program in university page interface

# 5  Conclusion

1. Dashboard of Quantitative Data for Academic Accreditation of Undergraduate Level Study Program is an Application of Executive Information System that automatically provide quantitative data for filling in instruments for accreditation of study programs in universities and at the same time verification during the visitation process. The dashboard generated from this study can facilitate and accelerate users to obtain data related to the accreditation of study programs needed.
2. This dashboard was developed using an Application Programming Interface (API) that has been integrated with academic information systems in university.
3. The data contained in the dashboard system has been adjusted to the requirement taken from the Study Program Form of the National Accreditation Board.

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