Optimizing the Information Presentation on Mining Potential by using Web Services Technology with Restful Protocol

T Abdillah*, R Dai and E Setiawan
Department of Informatics Engineering, Faculty of Engineering, Universitas Negeri Gorontalo, Indonesia

*tajuddin@ung.ac.id

Abstract. This study aims to develop the application of Web Services technology with RestFul Protocol to optimize the information presentation on mining potential. This study used User Interface Design approach for the information accuracy and relevance as well as the Web Service for the reliability in presenting the information. The results show that: the information accuracy and relevance regarding mining potential can be seen from the achievement of User Interface implementation in the application that is based on the following rules: The consideration of the appropriate colours and objects, the easiness of using the navigation, and users’ interaction with the applications that employs symbols and languages understood by the users; the information accuracy and relevance related to mining potential can be observed by the information presented by using charts and Tool Tip Text to help the users understand the provided chart/figure; the reliability of the information presentation is evident by the results of Web Services testing in Figure 4.5.6. This study finds out that User Interface Design and Web Services approaches (for the access of different Platform apps) are able to optimize the presentation. The results of this study can be used as a reference for software developers and Provincial Government of Gorontalo.

1. Introduction
Gorontalo Province has several gold mining locations, among others: (1) Pohuwato Regency (Pani and Bulontio Mountains); (2) Boalemo Regency (Bilato); (3) Bone Bolango Regency (Tulabolo); (4) North Gorontalo Regency (Hulawa and Ilangata Villages). In general, the mining location is traditionally managed by the community, so that the mercury level in the river in the mining area is as high as 0.5 μg / g [1] or above the safe level declared by the World Health Organization (WHO).

The information related to this mining location has not been well-presented so that the investment in Gorontalo mining sector remains very small. Truthfully, the potential of metal mineral (gold), Non-metallic mineral (Granite), Batu Gamping, Toseki, Felspar, and an Andesite with their reserve amounts are about 528.29 tons, 470.000.000 m³, 12,414,500 m³, 6,000,000 m³, 1,000,000 m³, and 1,050,000 m³ respectively [2].

Currently, the method of presenting the mining area information is still applied manually, so that the investors from other regions cannot access it directly. In consequence, the mining potential is not well-managed [3]. Therefore, this study will present the information by using Chart for the accuracy and relevance of the information [4].

Web Services Technology with the RESTFul protocol is employed to present the mining information to be accessible by using mobile devices and other wireless devices. It is because RESTFul protocol is lighter and suitable to be accessed by the resource-limited devices [5].
This study is intended to optimize the information presentation of mining potential in Gorontalo Province by using Web Services technology with Restful Protocol as well as two following approaches: (1) the information accuracy and relevance; (2) the reliability in presenting the information.

2. Methods

2.1. User interface design model

In some cases, the application users reject the use of the application since the User Interfaces design is not really practical, and therefore the suitability of the User Interface design can give a good impact on the application itself. An application with a good User Interface design must take into account the response time, command and action structure, error handling, and help facility in that application [6]. Several things need to be considered in designing the user interface in web-based applications are [7]:

2.1.1. Interface design. An excellent interface design considers the appropriate colors and objects in which each coloring should offer a meaning to the things. The users can easily use the in-app navigation objects. The users’ interaction with the application is utilizing symbols and languages understood by the users.

2.1.2. Information design. The data are presented in simple forms such as figure display and textual form in minimizing the information. The results of the design can predict what the user is doing in the application, and then the application delivers messages related to what he is doing. The availability of information that matches the character of the users is very crucial because the users who are already experienced with computers usage will be unsatisfied with long messages. Conversely, inexperienced users require long and detailed messages.

2.1.3. Interaction design. The application users’ habit, age, and computer knowledge should be considered in interaction design, including the computers used to run the application. Other considerations are age, gender, physical ability, educational background, culture or ethnicity, motivation, target and personality of the addressed system users [8]. There are three best rules for designing a user interface, which are: (1) Placing the controlled user; (2) Reducing the user's memory load; (3) Creating a consistent interface [9].

2.2. Web services model

The Internet has changed the way people live today, such as how to communicate, share knowledge, trade, and entertainment [10]. It is the part of the Information and Communication Technology (ICT) that has a positive impact on various sectors of life, including human development. However, ICT cannot improve people's lives [11].

The current technology of presenting information has entered the age of web services, which is according to [12], web service is defined as "a software system identified by a URI, whose public interfaces and bindings are defined and described using XML. Its definition can be discovered by other software systems. These systems may then interact with the Web service in a manner prescribed by its definition, using XML based messages conveyed by Internet protocols.”

This research utilizes the RESTFul protocol on Web Services so that the information presentation on mining potential can be accessed by various devices (mobile and computer) in which the results [5, 13] reveal that RESTFUL protocol is more suitable than SOAP to be accessed by using Wireless devices (measured by small message size and fast response time). On the contrary, SOAP is better than the RESTFul protocol for its security.

Another reason for using RESTful in this research [14] is that RESTful has a faster response time than SOAP because of the few throughput of RESTFul, which reduces the whole Web Services performance.
3. Results and Discussion

3.1. The accuracy and relevance of the information
This study employs approaches [4, 7] to optimize the information presentation of mining potential.

3.1.1. The implementation of user interface in the applications
3.1.1.1. The appropriate colors and objects consideration

The coloring in the application uses a combination of colors that can be distinguished (e.g., black is combined with white). The consideration of this colors combination is due to male dominance as the application users (7% of men have Deuteranomaly). Figure 1 displays the main menu of the application that uses the appropriate colors combination.

Figure 1. The Main Menu by using distinguished colors combination.

3.1.1.2. The easiness of using the navigation
The navigation created in the application makes it easier for the users to use it, such as to determine the closest distance from the current position to the mining location. Figure 2 shows the map with the path to be passed through. The application users can choose the display mode: map or satellite.

Figure 2. Map of mining potential with the location sign.
3.1.1.3. The users’ interaction with the application is using symbols and languages understood by the users

The symbols in the application are commonly used and known in the computers area, while the language used is the Indonesian language.

3.1.2. The presentation of information. In presenting the information, the charts are used to facilitate the users in understanding the information. Tool Tip Text is provided in the application to help users understand the charts/pictures by placing the mouse pointer over the object. Figure 3 displays the information for the investors about the presentation of metal and non-metal contents in Gorontalo Province.

![Figure 3](highcharts.com)

**Figure 3.** The presentation of graphical information with Tool Tip Text.

3.1.3. The users’ interaction with the application. This application is created for users who have the ability to operate a computer and mobile device. It is because the result of the interview finds out that the application users are commonly proficient with a computer.

3.2. The reliability in presenting the information

The reliability in presenting the information is tested by employing Response Web Service with two test scenarios, including ‘Testing’ that is conducted by accessing the Web Service Client by utilizing the Add-Ons from Mozilla Firefox which is SOA Client. This is to find out if the WSDL created can work properly when the client accesses it. The first step to test the web service in this library is by inputting the URL of web service that will be tested in the column of WSDL address. In this study, the URL of the web service to be tested is http://sippt-glto.com/config/service/index.php?wsdl.

After that, the URL WSDL is inputted to the Restful Client, and then click the Parse WSDL button, so that it will show a display as presented in Figure 4.
Figure 4. The result of parse WSDL.

Figure 4 is the display result after clicking the Parse WSDL. It includes the operations that we will choose. After selecting the available operation, input the parameters or code to be requested. There are two operations that have been provided, namely getlogam and getNonLogam. In that operation, the year parameters have been provided. Therefore, input the year parameter to request the existing data. For example, put 2016 in the getlogam operation. After clicking the invoke button, the response from the getlogam operation with the parameter of 2016 will be displayed in the Result column as shown in figure 5.

Figure 5. The testing result of getlogam operation with parameter of 2016/

Based on figure 5, it can be seen that getlogam operation is successfully executed and gives a response as created. The response of the getlogam operation consists of username, company, company address, job title, uploaded approval file, commodity name, regency name, sub-district name, and location. Figure 6 shows the list of investors to be used by the other information system.
4. Conclusions
Optimizing the information presentation of mining potential by using Web Services Technology with the Restful Protocol has been explained. The application is created by following the rules of web-based application design.

Acknowledgments
The authors express their gratitude and appreciation to the Directorate General of Higher Education, Ministry of Research, Technology and Higher Education of the Republic of Indonesia that has funded this research as well as the Rector of Universitas Negeri Gorontalo and the Head of Research and Community Service Institution (LPPM) Universitas Negeri Gorontalo who have proposed the research funding.

References
[1] Arifin Y I, Sakakibara M, and Sera K 2015 Impacts of Artisanal and Small-Scale Gold Mining (ASGM) on Environment and Human Health of North Gorontalo Regency, Gorontalo Province, Indonesia Geosciences Journal 5 p 160-176.
[2] BPMPTSP 2015 Potensi Pertambangan dan Energi Provinsi Gorontalo [Mining and Energy Potentials in Gorontalo Province] (Online) Available at: http://bpmptsp.gorontaloprov.go.id/potensi-pertambangan-dan-energi. Accessed on May 6, 2017.
[3] D Roviana, A Tajuddin and S Edi 2016 Geographical Information System Model for Mining Potential Data Management Presentation in Kabupaten Gorontalo Proceedings IOP Conference Series 180(1).
[4] A R Montazemi and S Wang 2015 The Effects of Modes of Information Presentation on Decision-Making: A Review and Meta-Analysis Journal of Management Information Systems.
[5] Kishor Wagh and Ravindra Thool 2012 A Comparative Study of SOAP Vs. REST Web Services Provisioning Techniques for Mobile Host Journal of Information Engineering and Applications 2(5).
[6] Sridevi S 2014 User Interface Design International Journal of Computer Science and Information Technology Research 2(2) pp 415-426.
[7] Sandhya I and Suchithra 2017 User Interface Design in E-commerce Website Imperial Journal of Interdisciplinary Research (IJIR) 3(5).
[8] Shneiderman B 1997 Designing the User Interface (3rd ed) (Addison-Wesley).
[9] Mehdi B and Bahrami M 2012 A Review of Software Architecture for Collaborative Software’s (Advanced Materials Research).
[10] Adeoye O S 2012 The Internet And The Needs Of The Society International Journal of Computer Science and Information Technology & Security (IJCSTS) 2(3).
[11] Usman-Hamza F E 2012 Information And Communication Technology In Relation To Human Development International Journal of Computer Science and Information Technology & Security (IJCSTS) 2(3).
[12] W3C 2002 Web Services Architecture Working Group Charter (Online) Available at: http://www.w3.org/2002/01/ws-arch-charter
[13] Hamad H, Saad M, and Abed R. 2010. Performance Evaluation of RESTful Web Services for Mobile Devices International Arab Journal of e-Technology 1(3).
[14] Bora A and Bezboruah T 2015 A Comparative Investigation on Implementation of RESTful versus SOAP-based Web Services International Journal of Database Theory and Application 8(3).