DEVELOPMENT OF BACKEND FOR KIDS INTERNET USAGE MONITORING APPLICATION "DODO KIDS BROWSER" WITH MICROSOFT AZURE TECHNOLOGY

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ABSTRACT

Not all useful information on the Internet, especially for children, so it is very worrying for parents. Dodo Kids Browser help parents in monitoring the activities of children when using the internet. In use, these applications must be able to manage data such as data of parents, children search data, until must be able to manage the connections and data transfer. Backend Dodo Kids Browser is a software built using Microsoft Azure technology and Boyer-Moore algorithm to overcome it. This software will manage the data received from each platform Dodo Kids Browser application. In addition to managing the data, this software is also a bridge of interaction performed on the side of parents to child with helping send the data notification to Dodo Kids Browser application platform.

Based on the results of functional testing can be concluded that the software Backend Dodo Kids Browser has been able to help Dodo Kids Browser applications to manage data and determine a good word for the children when using these applications to access internet. Advice can be given is the addition of storage so that this software can accommodate more user data and optimization system that includes notification, data transfer, and presenting data.

Keywords : Backend, Microsoft Azure, Boyer-Moore, Dodo Kids Browser.

1. INTRODUCTION

In this section will be presented the background of the problem, purpose and objectives, and the basic theory.

1.1 Background of The Problem

Technological developments, especially that includes search information on the Internet is very easy for people in all professions and ages so indirectly any information on the internet evolved. Reporting from the BBC's online news site says that at the end of 2015 is estimated at about 3.2 billion people will be connected to the Internet and about 2 billion of whom live in developing countries. [1]

Indonesia is a developing country which currently has a population of approximately 250 million people and almost all residents of the state of Indonesia already know what it is technology, especially the Internet. This causes each resident daily life can not be separated from the Internet, including among children and adolescents, it is based on the study results Kemenkominfo and UNICEF in 2014 which claimed as many as 98% of children and adolescents know about the Internet and 79.5% are users the internet [2], and as much as 52% of the 43.5 million children and adolescents aged 10 to 19 years using smartphones to access the internet to search for data and information, especially for school assignments, communicating with friends via social media, search for music and video content, as well as other sites where the contents are not necessarily appropriate and safe for consumption by children while the parents are not able to fully monitor the child's Internet activity on the smartphone so that potential negative risks of such content to be high [3]. From the exposure of some of these facts the importance of the main problems is how parents can control and know their child's internet usage activity.

Dodo Kids Browser is an Internet browser application built to overcome these problems. This application helps children to find good information on the Internet by typing the word / phrase or based greeting word / phrase and also helps parents to supervise their children when accessing the Internet. Based on observations made by trying the service provided on the application Dodo Kids Browser, this application will check the word / phrase is entered if it has the content is good or bad for children so parents need not worry anymore of his son when browsing on the internet because this application will provide a report (report) in the form of a history of internet access to parents and this application will tell the parents sites such as what is being visited by children at a time and action as to what would be given by parents to children based on accessing the Internet conducted by children. This application is built on two platforms are mobile applications that are currently implemented on Windows Phone and browser extension applications that are implemented

on an Internet browser such as Google Chrome. To be able to run well, both these applications must be able to manage a large enough data such as user data or parents and the data word is entered by children when accessing the Internet. In addition, these applications must have a good response when in use so it needs connection management and data transfer for an application platform Dodo Kids Browser.

Based on the problems that have been describe, then built a backend software that can help both the application platform in the form of managing the data enter the word / phrase, user information, and the interaction of action to mobile devices and browser extensions. This backend application is in the form of a web service application built using Microsoft technology are Microsoft Azure. In addition, in order to further optimize the application when determining a inserted word good or bad for the child, then this software is implemented a word matching algorithm (string) is the Boyer-Moore algorithm.

1.2 Purpose and Objectives

Purpose of this research to build the backend application "Dodo Kids Browser" and objectives of this research is as follows:

1. Assist application in managing the data enter of word / phrase.
2. Assist the admin application to manage user data, in this case the data parents.
3. Assist application to manage the connection and data transfer from / to mobile devices and browser extensions.

1.3 Microsoft Azure

Microsoft Windows Azure is a cloud computing technology which was developed by Microsoft. By using Windows Azure, developers can create Web applications, as data storage application, as a connection bridge between platforms, and so on. Here are the components contained in Windows Azure:

1. Cloud Applications
2. Data Management
3. Networking
4. Identity and Access Control
5. Messaging and Integration

By using Microsoft Azure technology, obtained some advantages are:

1. The developer simply making software / systems because Microsoft would protect the system, including if it will be the renewal or backup data.
2. Easy to increase the amount of data storage capacity.
3. Integrated with Microsoft Visual Studio.
4. The existence of such management on the Application Server is used. [4]

1.4 Web Service

Web Service is a software designed to support interoperability between machine interaction over a network either aggregation (gathering) and syndication (unification). Web Service serve the data integration and collaboration of information that can be accessed via the Internet by users with proprietary technologies. The calling web service can be done by any programming language and any platform. Here are the advantages of web Service:

1. Cross-platform.
2. Language Independent.
3. The bridge connecting to the database without the need for a database driver and does not have to know the type of DBMS used.
4. Simplify the process of data exchange.
5. The reuse of application components.

In the process, the web service knows two methods oriented services and information resources, namely the method of SOAP (Simple Object Access Protocol) with the service process has three main components, namely:

1. Service Provider
2. Service Requester
3. Service Broker

As well as supporting components, namely:

1. XML.
2. SOAP-XML (consisting of header and body).
3. WSDL.
4. UDDI.

And the method REST (REpresentational State Transfer) based on the four main principles of technology, namely:

1. Resource identifier through the Uniform Resource Identifier (URI).
2. Uniform Interface, namely resource CRUD operations using PUT, GET, POST, and DELETE.
3. Self-descriptive messages, that resources are not tied so that they can access the content HTML, XML, PDF, JPEG, plain text, meta data, and more.
4. Stateful interactions through hyperlinks.

Methods of REST is simpler because it uses a standard format (HTTP, HTML, XML, URI, MIME), and if necessary to the process of data exchange, content is the result of the execution of a web service can be processed in text format (XML or HTML) by using utility data communication in the form of a socket connection available on the HTTP protocol communication library programming language. [5]

1.5 JSON (JavaScript Object Notation)

JavaScript Object Notation is a lightweight data interchange format, easily read and written by humans, and easily translated and made (generated) by the computer. This format is based on part of the

JavaScript programming language, Standard ECMA-262 3rd Edition - December 1999.
JSON structure and shape consists of:

1. **Object** (name / value pairs that are not sorted). In the object there is the opening curly brace for the start and end by closing curly braces ({}), is contained within the curly braces name followed by a colon (:) and each name / value pairs separated by a comma (,).
2. **Array**, a sorted collection value. Array begins with the square brackets open and close with square brackets ([]), and each value is separated by a comma (,).
3. **Value**, can be a string in double quotes ("") or a number, or a value of true, false, and null, or an object or array. These structures can be nested.
4. **String**, is a collection of zero or more Unicode characters, wrapped in double quotes. Can be used in the string backslash escapes "\" to form a special character. A character representing a single character in the string and the string is very similar to C or Java string.
5. **Figures**, the value of which is very similar to the numbers in C or Java, except octal and hexadecimal formats are not used. Empty spaces (whitespace) can be inserted between the pair signs, except for a few details that complete encoding described by the programming language used. [6]

1.6 API (Application Programming Interface)

Application Programming Interface is a set of commands, functions, components and protocols provided by the operating system or specific programming language that can be used by developers / programmers when building software. In the API are functions / command to replace the language used in the system call in a language that is easily understood by programmers.
The advantages of the API are:

1. Profitability, programmer that uses the API able run the program with any operating system as long as it is installed the API.
2. Easy Understandably, the language used is more structured and easily understood by the programmer rather than the language system call. [7]

1.7 Algoritma Boyer-Moore

Boyer-Moore algorithm created by R.M Boyer and J.S Moore. This algorithm is famous for many implemented in the case of a fast string matching Boyer-Moore algorithms perform matching of characters starting from the right to left. Rightmost characters in the pattern is the first character to be matched with the text. This algorithm has two phases, preprocessing phase that there are two functions to shift the pattern to the right direction are:

1. Good-Suffix-Shift, this function is stored into a table bmGs (Boyer-moore Good suffix) measuring m + 1.
2. Bad-Character-Shift, this function is stored in a table bmBc (Boyer-moore Bad character) size n.

And the phase of the search string.

Formation tables bmBc and bmGs have time complexity O (m + n) and space complexity O (m + n). Complexity time for the search phase is O (mn). [8]

2. CONTENTS OF RESEARCH

In this section presented a description of the problem analysis, analysis of implementation of the Boyer-Moore algorithm, environmental implementation, and testing.

2.1 Problem Analysis

The problems obtained when Dodo Kids Browser application usage is as follows:

1. There is no place in the form of of data management enter the word / phrase for Dodo Kids Browser application.
2. There is no place management of user data, in this case the data parents for Dodo Kids Browser application.
3. No place connection management and data transfer between platforms Dodo Kids Browser.

2.2 Analysis of Implementation of The Boyer-Moore Algorithm

Use of the Boyer-Moore algorithm is performed to determine whether the keywords used by children when accessing the Internet is good or bad word for children. Stages using the Boyer-Moore algorithm can be seen in Figure 1:

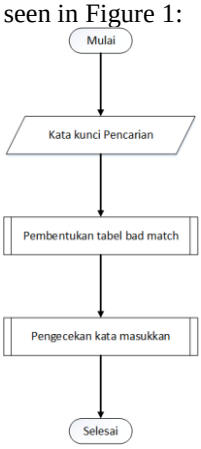


Figure 1. Flowchart Boyer-Moore Algorithm

In Figure 1 it can be seen that the process used to perform a search keyword matching the child with a bad set of words in the database must go through two procedures are:

1. The procedure for the formation of bad match table

This procedure is done on the process of forming bad match table or pattern table for each word in database. Bad match table is used to find a bad word obtained on a keyword search. Process on this procedure can be found at Figure 2.

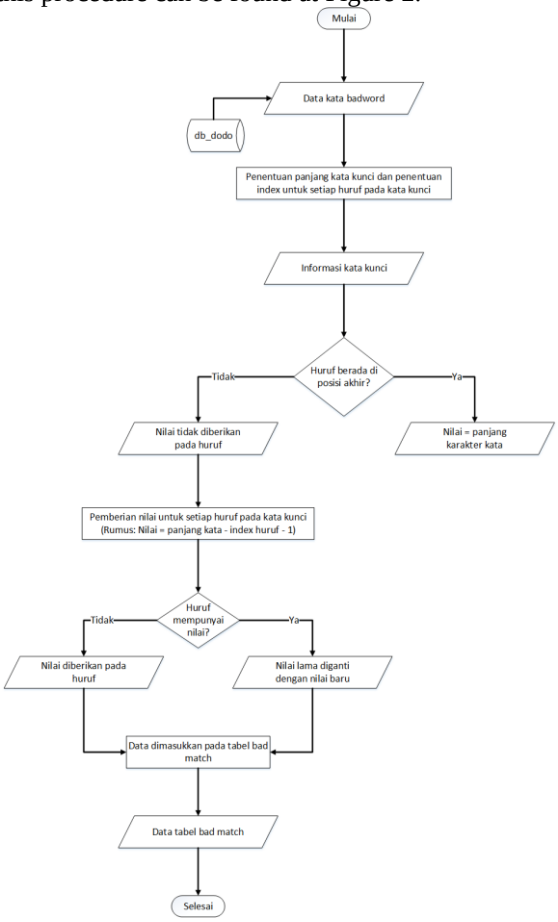


Figure 2. Flowchart the procedure formation of bad match table

For example, suppose there is the word "BASTARD" on a database that is a bad word. In that word, search length of the character and shape of the index for each letter as shown in Table 1.

Table 1. Keyword Information

Keyword	Information							
BASTARD	Length = 7							
	Index =	B	A	S	T	A	R	D
		0	1	2	3	4	5	6

After being known information about keywords, then build bad match table with the following process on Table 2.

Table 2. The process of forming bad match table

Process 1								
Keywords	**Process Information**							
BASTARD	B = 7-0-1=6							
	Result							
	Letter	B	A	S	T	R	D	*
	Value	6						
Process 2								
Keywords	**Process Information**							
BASTARD	A = 7-1-1=6							
	Result							
	Letter	B	A	S	T	R	D	*
	Value	6	5					
Process 3								
Keywords	**Process Information**							
BASTARD	S = 7-2-1=6							
	Result							
	Letter	B	A	S	T	R	D	*
	Value	6	5	4				
Process 4								
Keywords	**Process Information**							
BASTARD	T = 7-3-1=3							
	Result							
	Letter	B	A	S	T	R	D	*
	Value	6	5	4	3			
Process 5								
Keywords	**Process Information**							
BASTARD	A = 7-4-1=2, (Value 2 replace previous A value that is 5)							
	Result							
	Letter	B	A	S	T	R	D	*
	Value	6	2	4	3			
Process 6								
Keywords	**Process Information**							
BASTARD	R = 7-5-1=1							
	Result							
	Letter	B	A	S	T	R	D	*
	Value	6	2	4	3	1		
Process 7								
Keywords	**Process Information**							
BASTARD	D = 7, (D is a last character)							
	Result							
	Letter	B	A	S	T	R	D	*
	Value	6	2	4	3	1	7	7

2. Procedure of word checking

In this procedure performed the process of checking inserted word on the mobile platform or browser extensions with bad match table to determine if the inserted word includes a bad word or good word for the child. Process on this procedure can be found at Figure 3.

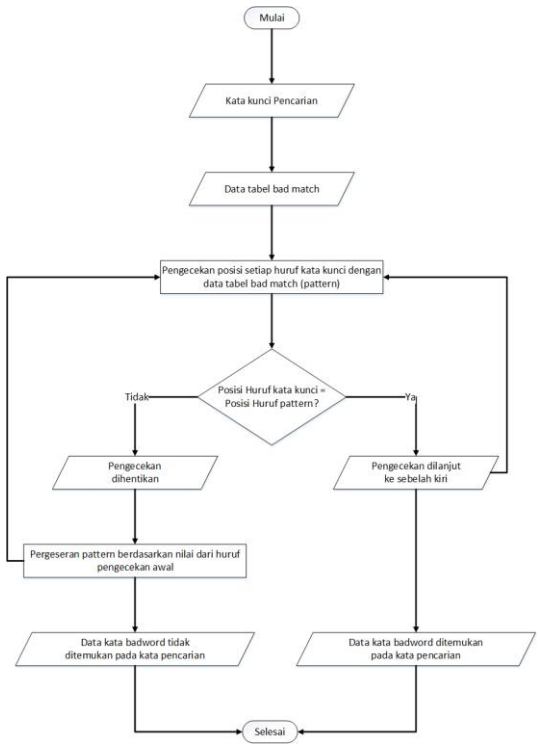


Figure 3. Flowchart procedure of word checking

For example, suppose the keywords entered is "THEBASTARDBOYS" will be compared with data bad match table of word "bastard" in the database.

The following is the process of checking inserted word "THEBASTARDBOYS" with the word "Bastard" which has been formed on the table bad match at Table 3.

Table 3. Process of checking inserted word

Process 1															
Word	T	H	E	B	A	S	**T**	A	R	D	B	O	Y	S
Pattern	B	A	S	T	A	R	**D**							
Information	T ≠ D, then the pattern shifted 3 times (weight value T = 3)													
Process 2															
Word	T	H	E	**B**	**A**	**S**	**T**	**A**	**R**	**D**	B	O	Y	S
Pattern				**B**	**A**	**S**	**T**	**A**	**R**	**D**				
Information	D = D R = R A = A T = T S = S A = A B = B Because the position of the letters in the inserted word = position of the letters on the pattern, then the inserted word contains a bad word for children.													

2.3 Environmental Implementation

The builded system is a web service that is assigned to manage the required data for Dodo Kids Browser includes managing the connection and transfer of data between an application platform Dodo Kids Browser. This system is implemented on Microsoft Azure with standard package, the following are the specifications of the Standard package on Microsoft Azure on Table 4.

Table 4. Specifications Standard Package Microsoft Azure

Item	Specifications
Processor	1 Core
Memory	1.75 GB RAM
Storage	50 GB
Custom Domains/SSL	5 SNI, 1 IP
Auto Scale	Up to 10 Instances
Backup Plan	Daily
Web App Staging	5 Slots
Geo Availability	Traffic Manager

2.4 Testing

On a system will be performed functional testing using black box testing to determine if backend Dodo Kids Browser functionality has been able to help Dodo Kids Browser application platform. From the testing that has been done, the following is the conclusion of the test results on the Backend Dodo Kids Browser at Table 5.

Table 5. Conclusion of the test results

No	Fungsional	Hasil Pengujian
1	Login	Fungsional dapat berjalan dan dapat digunakan untuk setiap *platform* aplikasi Dodo Kids Browser.
2	Tambah Data User	
3	Ubah Data User	
4	Tambah Data Kata	
5	Pencocokan Kata	
6	Penyajian Data Report	Fungsional dapat berjalan dan dapat digunakan untuk *platform mobile* aplikasi Dodo Kids Browser.
7	Penyajian Data Chart	

3. CONCLUSION

In this part will be presented regarding the conclusions of the research and suggestions presented on research.

3.1 Conclusion

Based on test results Backend Dodo Kids Browser, it can be concluded as follows:

1. Backend Dodo Kids Browser has been able to manage the input data obtained from the mobile platform and browser extension application platform Dodo Kids Browser.
2. Backend Dodo Kids Browser has been able to manage the user data in this case the data parent who using Dodo Kids Browser application.

3. Backend Dodo Kids Browser has been able to manage the connections and data transfers between an application platform Dodo Kids Browser.
4. Backend Dodo Kids Browser has been able to implement the Boyer-Moore algorithm properly when matching words from Dodo Kids Browser application platform with the words contained in the database.

3.2 Suggestions

Backend Dodo Kids Browser needs to be done for maintenance and development along with the development platform Dodo Kids Browser application. As for suggestions to the maintenance and development of applications Backend Dodo Kids Browser next are as follows:

1. The addition of storage for applications Backend Dodo Kids Browser in Microsoft Azure in order to accommodate the input data from more users.
2. Optimized notifications are sent to the application platform Dodo Kids Browser.
3. Optimization of data transfer and presentation of data required for Dodo Kids Browser application platform.

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