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# Development of an android document management



# Development of an android document management

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**Abstract**. Many previous researches shown the percentage of population using mobile technologies was increasing constantly, included in Indonesia. This growth apparently also supported by Android penetration as an Operating System and the easier of internet access. Mobile phone has become the main device in daily life, included in business activities. People increasingly need a mobile phone as gadget for storing various documents. This research is designed to address the document management application in Android. Application help to organize, retrieve and modify document contents. With this Android application, users can use it to store documents and can combine several documents as desired. This application works based on HTML format file. Therefore, the original files are converted to html format. While the conversion process cannot be done directly, but the original file is converted to pdf and then converted to html. All the conversion process is done in the server and application retrieve the result as HTML file for displaying in the mobile phone screen. During the converting process, it is found that the number of concurrent users is not relevant with the server respond time. The server respond time is determined by document size.

## 1. Introduction

The penetration of mobile technologies for past two decades have been shifted many aspects in culture and civilization. In Indonesia, the percentage of population using mobile technologies was increasing constantly, up to 2017 it reached 59.59 percent. The mobile phone users in last five years is presented in figure 1 [1].

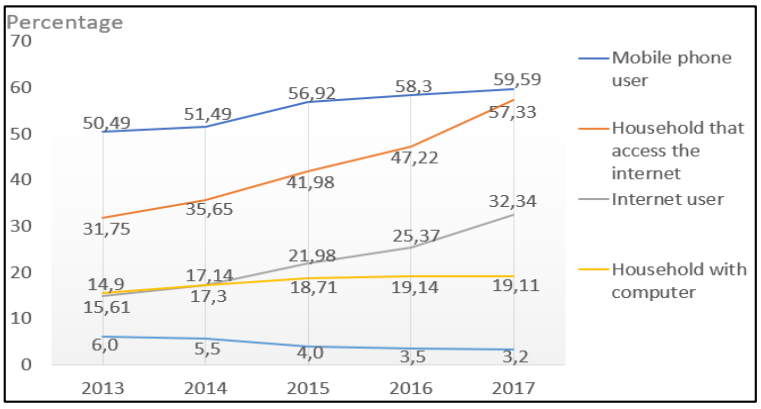


**Figure 1.** Trend of ICT indicator in Indonesia, 2013-2017 [1].

Other previous research in 2018, Indonesia mobile phone users was 71%, which is 45% of men and 39% of women. Moreover, figure 2 shown the rate of mobile phone users were increase 39% in 2015 and became 66% in 2018 for younger people; 2% in 2015 became 13% in 2018 for above 50 years old. The adoption has grown almost doubled, only in the span of three years [2].

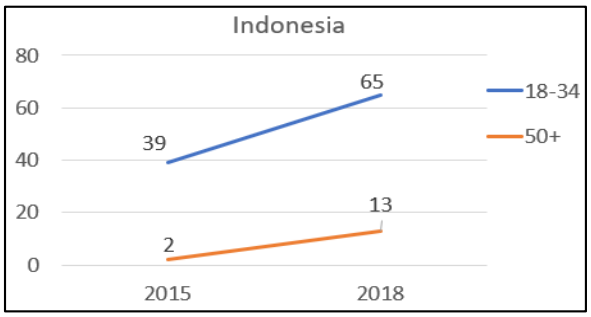


**Figure 2.** The rate of mobile phone ownership in Indonesia [2].

The fast growth of mobile phone users in Indonesia, apparently also supported by Android penetration as an operating system [3,4]. Currently, Android users in Indonesia have reached 91.53% as shown in figure 3. This dominance ease user education in using mobile technology to support daily activities [5].

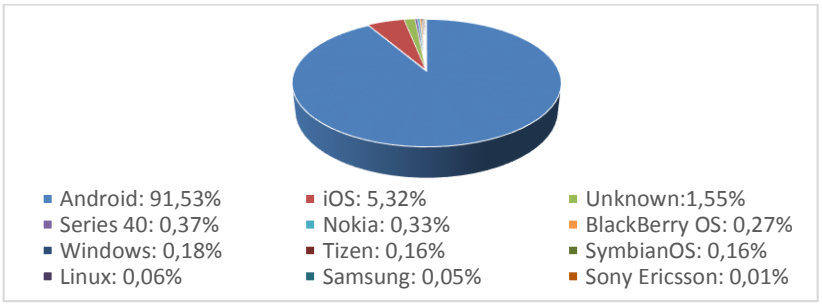


**Figure 3.** Mobile operating system market share Indonesia [5].

Without realizing it, this condition creates a transformation where the boundaries of information flow are increasingly blurred. Supported by the easier and cheaper internet access, mobile phone has become the main device in daily life, included in business activities. These activities are also supported by the growth various of applications. Many applications allow activities on the computer could be done the mobile phone screen. Data need to be exchanged between mobile phones and on computers. This change has affected the need to manage the document in mobile phone [6,7]. People increasingly need a mobile phone as gadget for storing various documents. Therefore, we need an application to manage these data or files on mobile phone. This research is designed to address the document management application in Android. Application help to organize, retrieve and modify document contents. With this Android application, users can use it to store documents and can combine several documents as desired.

## 2. Related Works

### *2.1. PhoneGap*

PhoneGap is an open source framework that help programmer develop mobile cross-platform applications with HTML, CSS, and JavaScript. As one of the requirements for the project was functionality on multiple platforms, PhoneGap was the obvious choice, which was supported by the fact that the size of the development team was only five people and there were not enough resources to

develop a native application for all platforms [8]. In the 2008, PhoneGap was created at Nitobi Software. Nitobi was a web consultant with the JavaScript scene as the root. The PhoneGap code was contributed to the Apache Software Foundation [9].

### *2.2. jQuery mobile*

jQuery Mobile is the easiest way to build sites and apps that are accessible on all popular smartphone, tablet, and desktop devices. This framework provides a set of touch-friendly UI widgets and an AJAX-powered navigation system to support animated page transitions. jQuery provides javascript library that provide UI (User Interface) between Javascript and HTML. Released in 2006 at distribution BarCamp under MIT and GPL. With the surface slogan, which is to write less, do more that uses simpler syntax code but has more results. jQuery allows functionality in the form of plug-ins. jQuery is a Frame UI developed for the user interface rather than a mobile web application. Many of the features offered in this framework include HTML5 support, Ajax-powered navigation links, and touch / or navigation. jQuery Mobile is built based on the jQuery library. jQuery Mobile uses HTML5 and CSS3 to place pages with minimal scripting. Besides jQuery mobile, other frameworks that can be used such as Sencha, jTouch, DHTMLX Touch, Jo and others [10].

### *2.3. PDF info*

The Portable Document Format (PDF) is a document file format developed by Adobe in the 1993. This document format is independent of, hardware, operating systems, and application software. Every PDF file encapsulates a complete description of a fixed-layout flat document, including the text, fonts, vector graphic, raster images and other information needed to display it. PDF and Postscript language have same underlying Adobe imaging model. PDF was standardized as an open format, ISO 32000, in 2008, and no longer requires any royalties for its implementation [11]. PDF store the file information such as title, the font type and security settings. This information is created by the creator of the file and by computer (generated automatically). This research will use PDF info to get number of PDF file pages.

### *2.4. PDF tool kit*

PDFtk, which is short for PDF Tool Kit, is a handy software tool that allows to work with PDF documents. PDFtk could merge multiple documents together, split a large PDF document, to watermark a PDF document, and more [12]. It is a cross platform tool for manipulating Portable Document Format (PDF) file. PDFtk comes with three versions: PDFtk free (freeware), PDFtk Pro (proprietary paid) and PDFtk Server (open source with command line interface). In this version, PDFtk comes with command line interface and graphic user interface. This makes developer easier to build the application [13]. This research use PDFtk for manipulating the PDF file.

### *2.5. LibreOffice*

LibreOffice is a free, powerful and open source office application package developed by The Document Foundation (TDF). LibreOffice uses the OpenDocument (ODF) file format according to international ISO / IEC standards as the original format for storing documents throughout its application. LibreOffice is also compatible with other office application packages, including Microsoft Office, through various import / export filters. The Microsoft Office file format is well supported, although some layout features and formatting attributes are handled differently in this application or the same is not fully supported in these filters [14].

### *2.6. PDF2HTMLEx*

This tool is used to help converting pdf documents into html format. It supports an accuracy rendering for web display, font, image and math formula. PDF2HTMLEx package, is licensed under GPLv3+. Some resource files are released with relaxed licenses [15].

## 3. Proposed System

The proposed system to answer the research objective is illustrated in figure 4.

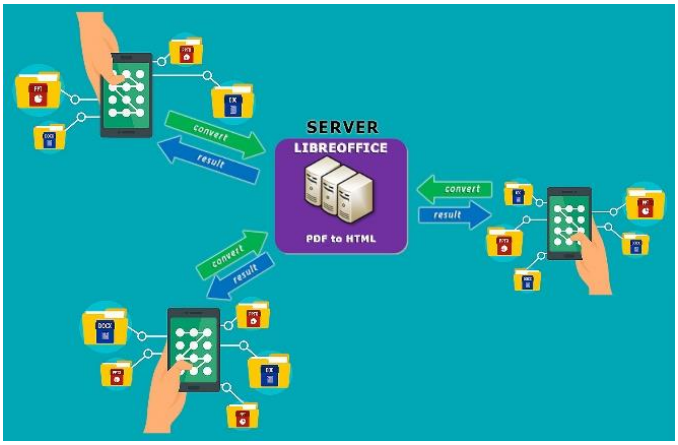


**Figure 4.** The system for Android document management.

This application is divided into several menu options as the main application page, which are new, open, delete, merge, and bookmarking document. When the user opened this application, program listed all the documents name in mobile phone memory. User might choose the document by tapping the documents name. The selected document (doc, docx, ppt and pptx) in mobile phone was sent to the server for converting process. The converting process is conducted from original format to PDF using Libre Office and PDF2HTMLEx. Libre Office keep the original format of graphics (JPG format) and convert the original formal to PDF. Then, the process converted the PDF file to HTML file using PDF2HTMLEx. Finally, the document will be sent to mobile phone in original format and displayed in mobile phone screen.

Users could delete, copy and merge document pages by choosing the page in document. The selected pages were stored in an array and will be displayed in the main menu to confirm request for delete or copy. For delete confirmation, number of pages will be displayed in pop up window as final confirmation for deleting process. As the confirmation was copying, the process will be continued as a merging document. It needed mark the pages (copy) and append to the second document. The copied page will be saved in new array and then user might open the second document to append the selected pages to this document using the paste button (merging document). Merging process could be done in several documents as the selected pages is saved in array. User also saved this new document as new file with new document name.

Full text searching as the feature of this application can be typed the word in the text box. The Javascript will match the word. When the matched word result is more than one, they will be displayed in paging page, therefore user can browse them by next button in application interface.

## 4. Result and Discussion

The functionality of this application is not limited to open and retrieve a document, but this application is also can merge and arrange the page in the document. Other features of this application are full text searching, bookmarking, document merging and delete document. Figure 5 shown the application main interface which is search bar, recent files, list of files and some other menu. User can search file by type the keyword in the search bar. This application needs to be run in Android with operating system: Lollipop and Jellybean.

Bookmark is the feature to help user for document marking. User press the file name for three seconds and the file will be bookmarked. The result of bookmarked files can be seen by tapping bookmark. This feature usually is used to mark the favorite files.

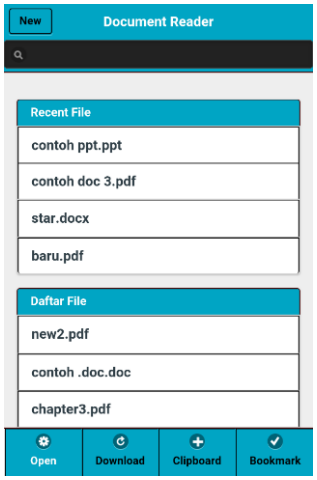


**Figure 5.** The application user interface.

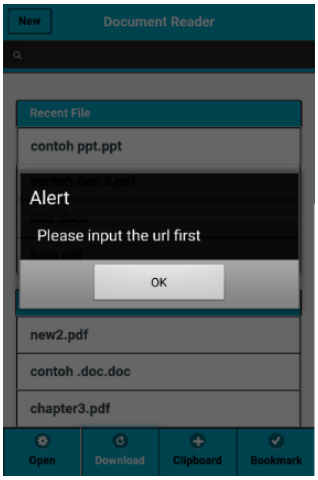


**Figure 6.** Alert dialog window in download menu.

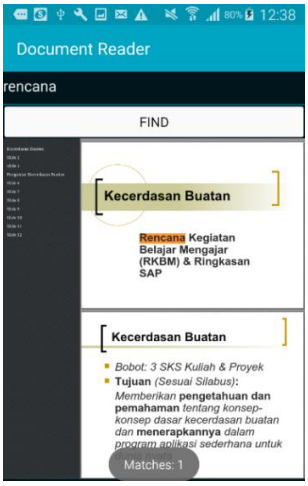


**Figure 7.** Result of the searching word in the opened document.

User can download file in internet by typing the URL in the search bar and tapping the download. When the user does not type the URL, alert will appear in the application as shown in figure 6. Searching full text also can be proceed by typing the word in search bar and searching result will be in the screen as in figure 7. Editing the document can be done after user select the document to open it. In the opened document, user can select some pages by tapping it. The option will be appeared in pop up menu which is giving option such as copy to clipboard, paste all and delete the selected pages. Delete feature is for erase the selected pages. Copy to clipboard is used to save the selected pages temporary. When user needs to paste the selected pages to other document, user can tap the paste all in new document.

Testing of this application is conducted using several Android phones to ensure all the features work properly. Moreover, checking to the server respond time has been done. The relation between file size, number of users and the time is needed to convert the file is shown in table 1. Figure 8 presented the chart of respond time for converting data.

**Table 1.** Respond time for converting file.

| File size (Mb) | 1 user | 2 users | 3 users |
|---|---|---|---|
| 1 | 10 | 10 | 12 |
| 2 | 29 | 31 | 34 |
| 3 | 36 | 39 | 41 |
| 4 | 38 | 42 | 45 |
| 5 | 78 | 83 | 84 |
| 8 | 38 | 44 | 49 |
| 9 | 29 | 35 | 35 |
| 11 | 44 | 59 | 40 |
| 30 | 357 | 364 | 364 |
| 50 | 475 | 479 | 481 |

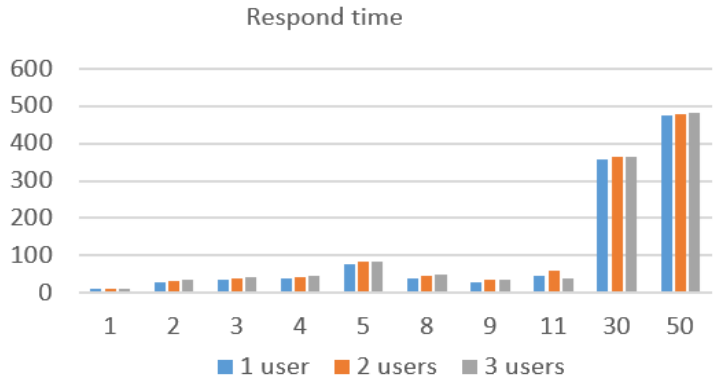


**Figure 8.** Respond time chart.

## 5. Conclusion

This application works based on HTML format file. Therefore, the original files are converted to html format. While the conversion process cannot be done directly, but the original file is converted to pdf and then converted to html. All the conversion process is done in the server and application retrieve the result as HTML file for displaying in the mobile phone screen.

During the converting process, it is found that the number of concurrent users is not relevant with the server respond time. The server respond time is determined by document size.

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