Content Management System

by Ahmad Zainul Fanani

Implementation of Text Copy Prevention on Content Management System based Website

Aris Marjuni[1], Ahmad Zainul Fanani[1], and Oky Dwi Nurhayati[2]

[1]Faculty of Computer Science, Dian Nuswantoro University, Semarang, Indonesia.

[2]Computer Engineering Department, Diponegoro University, Semarang, Indonesia.

aris.marjuni@dsn.dinus.ac.id

Abstract—**The modern of internet technology has a very wide impact on the content distribution through website. As a digital form, website contents have a vulnerability in the term of theft, misuse, plagiarism, illegal distribution, infringement of intellectual property rights, etc. To prevent those issues, it is important for website owner to protect their content so that unauthorized user has difficulties to copy, save, or distribute the contents without permission. This paper presents the implementation of content copy prevention, especially in text, using plugin development on content management system based website platform. The main objective is to develop a text copy prevention by utilizing common web browser function so that website contents are difficult to be copied or stored by visitors without the permission of the owner.**

Index Terms— **Text Copy Prevention; Content Management System; Content Protection; Website Browser Utilization.**

I. INTRODUCTION

Website is a collection of web pages that contain various forms of information such as text, images, graphics, video, audio, animation and more. At the beginning of the internet technology development a few decades ago (1990s), most of the website contents are almost formatted as text. However, along with the current internet technology, the existence of the website contents are more dynamic and interactive because multimedia contents, such as images, audio, video, animation and its combination can be managed easily through the website [1]-[2]. The presence of multimedia data processing technology has enabled the websites development for various purposes, such as personal websites, business, social media, forums, non-profit organizations, and more.

Website content is one of the main components in website development context, and it will effect on the website popularity. Website contents could be grouped into 2 (two) types, namely text and multimedia [3]. Text is usually used to convey a full range of information and details. Text also navigates visitors easily to obtain more information through text links. In addition to the text-shaped content, a website is also reached by multimedia content, such as images, video, animation, audio, graphics or a combination of the content. The ability of multimedia processing technology gives a very significant effect on website traffic. Textual information can be accompanied by audio and visual-based information (graphics, images, photos, animations, videos) in accordance with the relevance and purpose of website development so that the website becomes more interesting and dynamic.

However, as a digital form, a website contents is also vulnerable in the term of theft, misuse, plagiarism, illegal distribution, infringement of intellectual property rights, etc.

[4]-[6]. Many site owner, author, or webmasters are suffered because of the content thief, their original content copied without any permission and pasted on another site, such that their contents look like not original, duplication or have plagiarism. This issue can be seen from the number of websites which have a duplication of contents. In this study, implementation of text copy protection on the content management system (CMS) based website will be presented to study how practically protect website content on to avoid or reduce website text copying, illegal distribution, etc. As a discussion, WordPress (WP), as a popular CMS platform, is selected to realize the text copy prevention system. WordPress is a free and open source CMS based on PHP and MySQL.

This paper is divided into several sections. Section II presents a brief of content management system, Section III presents the content protection system, Section IV presents the implementation of text copy prevention, while conclusion will be presented in Section IV.

II. CONTENT MANAGEMENT SYSTEM (CMS)

Content management systems (CMS) are designed to enable users for creating, editing, or posting contents such as text, graphics, audio and video [7]. These systems are divided into two parts, that are backend system and front-end system. Backend system enabled site users to create, edit, or post the content. While frontend system is used to deliver the content to website and can be displayed by browser. In this context, the users can be administrators, authors, contributors, subscribers, etc. depending on how the interaction of user lever with the website. System integration between backend and frontend facilitate the users to manage their website without high-level knowledge in website programming. Another advantages of this CMS are: simplicity, security, open license, stability, up to date, and more [8]. The modern CMS is designed for users that they have full control in the internet presentation, such as personal websites, small or medium business, even for portal as a big business or companies [9].

A Web CMS is defined as a system that allows collecting, storing, and publishing contents, and offering various functionalities to the different categories of users [10]. The collection system is used in gathering and processing information, the management system is used to store and administer the formats, while the publishing system extracts the content component from the management system, and converts them into publications, as illustrated in Figure 1.

WordPress (WP) is one of the most popular of web CMS nowadays. This software or system can be downloaded at

www.WordPress.org and/or www.WordPress.com for free [7] and can be used to develop any types of websites, such as blog, personal website, news portal, e-commerce website, etc. As we see on their homepage portal, there are huge themes and plugins to build a website. Most of theme and plugins are free and provided by WP members to support website developers.
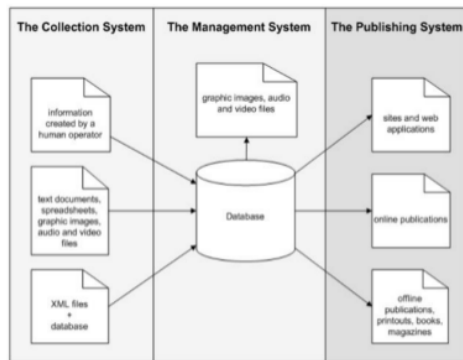

Figure 1: Content Management System Scheme

Theme is a term about layout or format of website, such as header, footer, single post, single page, sidebars, etc. While, plugin is a software tool which is designed for special functions and it can be added to support WordPress site, such contact form plugin to create a contact form, duplicator plugin to duplicate website, search and replace plugin to search and replace any text or term in database, and more. Usually, both of theme and plugin are designed by PHP and some Java scripts with open source license. However, there are some free and pro versions. The free version can be downloaded and used for free at WordPress portal with some features limitations. Although almost themes and plugins are free, it does not mean free from vulnerabilities, hackers, financial costs of support [11]. While the pro versions can be used with full features upon this theme or plugin are paid and get a specific license. There are many themes and plugins markets across internet to get pro version of themes and plugins.

With WordPress plugin API, developers are allowed to add or modify CMS to enhanced website functionality. Once WordPress plugin installed on the website, it will be registered in WordPress database. Users have an option to activate or deactivate any plugin as long as compatible with their WordPress version. Through WordPress plugin, all content types including website posts and pages, taxonomies, and custom fields can be utilized and stored in WordPress database. As a standalone extension, developers can update their plugin to many rich features and/or fix issues during implementation.

In this study, the implementation of text copy protection based on CMS will be realized through WordPress plugin with specific task function to prevent text copy protection. This method detail will be presented in Section IV.

III. TEXT COPY PREVENTION

Content infringement is a common issue for website authors, creative writers, or contributors. Using the current technologies, their website contents can be copied, saved, distributed, or pasted easily in different media or other sites without permission. In fact, there are little owners can prevent their contents from infringers. So, the need of content copy prevention is very important for content owners who don't have any skill and knowledge to prevent by their self. Currently, text is one of the main website contents as it has a universal type for information presentation and distribution. It is very difficult to stop content infringement perfectly, however, there are many ways to prevent or reduce the frequency of infringement. At least, the infringers must pass through many obstacles before they take site contents, as illustrated in Figure 2.

Figure 2: Text Content Protection

The most common text copy can be done using mouse and keyboard tool, and also browser software to display and access website, that are:

- Right click; this is a keyboard shortcut to show the related text menu, such as copy, paste, save, search, print, view page source, inspect, and more options. Using this shortcut, infringers can easily copy the original text without any permission from the owner.
- Text selection; most browsers allow users to select a part or all text displayed on website using their mouse. After selecting, they can copy, paste, save, search, print, view page source, inspect, and more options.
- Windows keyboard shortcut, such as Ctrl C, Ctrl A, Ctrl X, Ctrl V, Ctrl P, and Ctrl S. Those shortcuts are provided to make user easy to manipulate the selected or all entire text to copy, select all, cut, paste, and save.
- PrintScreen; although this feature not directly modifies the contents, but distribute the PrintScreened contents are also a type of content infringements.

Because the text contents are displayed by a browser application, so the alternative way to handle the text copy prevention can be realized by utilizing the web browser. The real implementation of this effort can be performed through these the following action:

- Disable right click.
- Disable text selection.
- Disable related keyboard shortcut, especially Ctrl C, Ctrl A, Ctrl X, Ctrl V, Ctrl P, and Ctrl S.
- Disable PrintScreen.

In the website admin mode, owner has an option to enable or disable those contents copy prevention actions. Means, owner can protect or unprotect their contents using text copy protection tools at admin dashboard.

IV. IMPLEMENTATION OF TEXT COPY PREVENTION

Website contents are usually viewed by a browser. A Browser is a software program which designed to present and explore website contents. All the contents, such as text, images, videos, and web pages are connected by hyperlinks and classified by Uniform Resource Locator (URL) that are termed as web address [12]. There are many web browsers, such as Google Chrome, Mozilla Firefox, Apple Safari, Microsoft Internet Explorer, Microsoft Edge, Opera, and more. A web browser used http (hypertext transfer protocol) to access web servers through internet.

Because of web contents should be accessed by web browser, then the implementation of text copy prevention could be done by utilizing web browser functions so that content administrator can control their displayed contents in order to prevent copy prevention. These implementation methods are performed by JavaScript programming through plugin application.

A. Disable Right Click

Most web browsers provide easy navigation to present web contents. By using right click with a mouse, we can show some context menus which allow users to save as, copy, view page source, etc. To prevent content copying, the right click can be disabled by the following main function:

```
$(function () {
$(text).bind('contextmenu',function(e)
{e.preventDefault();
alert('Right Click on text is disabled');});
```

Text contents come to web pages in various types, it can be linked reference, paragraph, order/unordered list, headings, text area, button, block quote, etc. To handle this various text, additional script can be performed to prevent the text copying through right click disabled. For example, if the text come from various format type, the following script can be added to the text detection.

```
checker = '<?php echo $settings['pb'];?>';
if ((clickedTag == "P" ||
clickedTag == "B" ||
clickedTag == "FONT" ||
clickedTag == "LI" ||
clickedTag == "UL" ||
clickedTag == "STRONG" ||
clickedTag == "OL" ||
clickedTag == "BLOCKQUOTE" ||
clickedTag == "TD" ||
clickedTag == "SPAN" ||
clickedTag == "EM" ||
clickedTag == "SMALL" ||
clickedTag == "I" ||
clickedTag == "BUTTON") && checker ==
'checked') {if (alertMsg_PB != "")
show_message(alertMsg_PB); return false;}
else {exception_tags = exception_tags + 'P,
B, FONT, LI, UL, STRONG, OL, BLOCKQUOTE, TD,
SPAN, EM, SMALL, I, BUTTON,';}
```


Figure 3: Right Click Disabled

B. Disable Text Selection

One of the chance to copy text content is selecting the content then copy or save as by contextual menu. To prevent this text selection, the following script can be used to disable text selection.

```
function disableSelection(target) {
if (typeof target.onselectstart!="undefined")
        target.onselectstart=function()
        {return false}
else if (typeof
target.style.MozUserSelect!="undefined")
        target.style.MozUserSelect="none"
else
        target.onmousedown=function()
        {return false}
target.style.cursor = "default"}
function disable_hot_keys(e){
var key2;
        if(window.event)
        key2 = window.event.keyCode;
else
        key2 = e.which;
if (key2 == 123
        {show_message('<?php echo
$settings['custom_keys_message']; ?>');
return false;}
```

Once text selection feature is disabled, visitors can't select characters or text on website with their mouse. All Ctrl+key's from keyboards are disabled, so text selection using Ctrl+A is also disabled.

C. Disable Control Keys

Browser provides control key shortcuts to make users easy to work with text content. Ctrl+C is used to copy text selection, Ctrl+A is used to select all text, Ctrl+X is used to cut the selected text, Ctrl+V is used to paste copied text, Ctrl+P is used to create PrintScreen content, while Ctrl+S is used to save text selection. To prevent text copying, a specific function is needed to disable all control keys above.

```
function disableCtrlKeyCombination(e) {
var forbiddenKeys = new Array("c", "a", "x",
"v", "s",);
var key;
var isCtrl;
if(window.event){key= window.event.keyCode;
```

```
if(window.event.ctrlKey)
isCtrl = true;
else isCtrl = false;}
else {key = e.which;
if(e.ctrlKey)
isCtrl = true;
else isCtrl = false;}
if(isCtrl)
{for (i = 0; i < forbiddenKeys.length; i++){
If (forbiddenKeys[i].toLowerCase()==
String.fromCharCode(key).toLowerCase()){
alert("Key combination CTRL + " +
String.fromCharCode(key) + " has been
disabled.");
return false;} }}
return true;}
```

When control keys are disabled, visitors will no longer to select, copy, paste, cut, or save a part or all entire text contents. Disabling some control keys will help content owner to prevent their content from copying or illegal distribution.
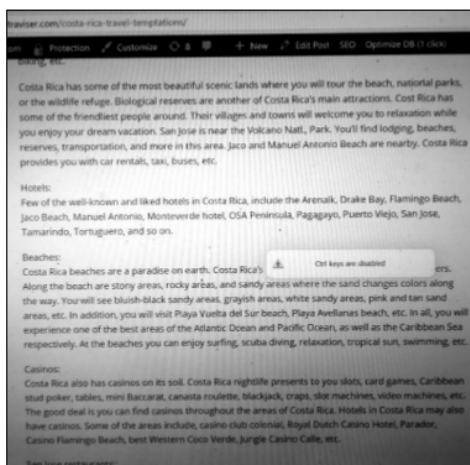

Figure 4: Control Keys Disabled

D. Disable Control Keys

The print or print-screen function allows visitors to take a screenshot of the viewed website and usually this screenshot is formatted as an image. Although this method is not direct copy the text content, however, it allows visitors to make a duplicate content by re-writing or re-distribution. To prevent this print or PrintScreen for content copying, this print or PrintScreen can be disabled through the plugin script.

```
window.addEventListener("keyup",
dealWithPrintScrKey, false);
function dealWithPrintScrKey(e) {
var prtsc = e.keyCode||e.charCode;
if (prtsc == 44){
document.getElementById("prntscr_disable_fiel
d").className = "showme";
var copyDiv=
document.querySelector('#prntscr_disable_fiel
d');
copyDiv.select();
document.execCommand('Copy');
var urlField =
document.querySelector('#prntscr_disable_fiel
d');
```

```
var range = document.createRange();
range.selectNode(urlField);
window.getSelection().addRange(range);
document.execCommand('copy');
document.getElementById("prntscr_disable_fiel
d").className = "hideme";
show_message('<?php echo
$settings['custom_keys_message'];?>');}}
```
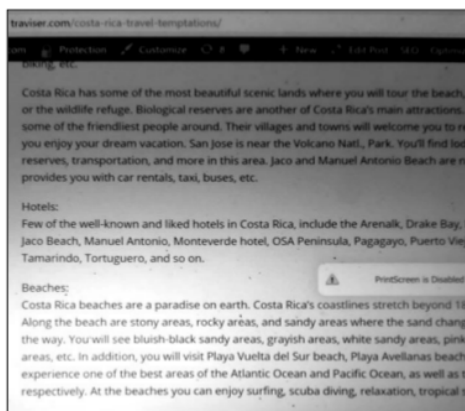

Figure 5: PrintScreen Disabled

E. Performance Evaluation

This text content copy prevention is implemented as a WordPress plugin. To evaluate the performance of this plugin, a little software testing has been performed in user area. Some features of text copy preventions, that are right click, text selection, control keys, and PrintScreen are tested to evaluate how the plugin works. The most popular browsers are selected to perform this test that are Mozilla Firefox, Google Chrome, Opera, and Internet Explorer. Evaluation results description is described in Table 1 below.

Table 1
Performance Evaluation Results

Disabled Functionality	Browser			
	Firefox	Chrome	Opera	Internet Explorer
Right click	Pass	Pass	Pass	Pass
Text selection	Pass	Pass	Pass	Pass
Ctrl C (copy)	Pass	Pass	Pass	Pass
Ctrl V (paste)	Pass	Pass	Pass	Pass
Ctrl X (cut)	Pass	Pass	Pass	Pass
Ctrl A (select all)	Pass	Pass	Pass	Pass
Ctrl S (save)	Pass	Pass	Pass	Pass
PrintScreen	Pass	Pass	Pass	Pass

Based on the evaluation test, the text copy prevention plugin works for most popular browsers, which have the following features, such as:

- Text prevention from being selected and copied.
- Disable the control keys: Ctrl C, Ctrl A, Ctrl V, Ctrl X, Ctrl P, and Ctrl S.
- Disable PrintScreen button keys.
- Compatible for most browsers.
- Users get alert message when they use right click, text selection, control keys, and PrintScreen buttons.

V. Conclusion

The browser technology allows users to present website contents, such as text, images, audios, and videos. It also allows visitors to copy, select, save, or distribute the contents from a website without any permission from the content owner. To prevent contents infringement through website, the content copy prevention could be implemented by utilizing browser functions. Implementation of the text copy prevention plugin has been discussed in this paper and tested successfully across popular browsers. Through this application, the content owners have an option to enable or disable the content protection features. Experiment results show that text copy prevention plugin works properly. For future work, this plugin can be extended to another content, such as images, audios, and videos.

Acknowledgment

References

[1] J. Kludas, "Multimedia Retrieval and Classification for Web Content", in *Proceedings of BCS IRSG Symposium: Future Directions in Information Access (FDIA)*, 2007.

[2] P. M. Kamde, and D. Algur, "A Survey on Web Multimedia Mining", *Int. J. Multimedia & Its Applications,* vol.3, num. 3, pp. 72–84, 2011.

[3] J. Kyrnin. *Responsive Web Design with HTML5 and CSS3 in 24 Hours.* Pearson Education, 2014.

[4] S. H. Kwok, C. C. Yang, C.C., and K. Y. Tam, "Intellectual Property Protection for Electronic Commerce Applications", *Journal of Electronic Commerce Research*, vol. 5, num. 1, pp. 1-13, 2004.

[5] G. Vaidyanathan, and S. Mautone, "Security in Dynamic Web Content Management Systems Applications", *Communications of the ACM Magazine*, vol.52, num. 12, pp.121-125, 2009.

[6] S. Lemeš, "Information Security Management of Web Portals Based On Joomla CMS", in *Proc. of the 15th International Research/Expert Conference: Trends in the Development of Machinery and Associated Technology*", Prague, Czech Republic, 12-18 September 2011, pp. 509-512.

[7] F. Novalić, E. Dautović, M. Kudumović, and N. Pazar, "Security of Web Content Management Systems", *Unite Journal*, vol. 1, no, 1, pp. 37-41, 2014.

[8] D. Petrović. *Analysis of the impact of the AES cryptographic algorithm on the performance of various database management systems.* Master rad, Univezitet Singidunum, Beograd, 2013.

[9] N. Kavečan, "Analysis of different content management systems for internet presentations". In *The International E-Commerce Conference* 2010.

[10] D. Mican, N. Tomai, and R. I. Coros, "Web Content Management Systems, a Collaborative Environment in the Information Society", *Informatica Economică*, vol.13, no. 2, pp. 20-31, 2009.

[11] T. Canavan. *CMS Security Handbook: The Comprehensive Guide for WordPress, Joomla, Drupal, and Plone, 1st Edition*. Indiana: John Wiley and Sons Publishing, 2011.

[12] Computer   Hope   [Online].   Available: http://www.computerhope.com/jargon/b/browser.h

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