

Playing Region-blocked Game using Chrome Extension with IP Spoofing. Kantai Collection Case Study

Rifky Fachry Muchamad¹, Erick Paulus, S.Si., M.Kom², Dr. Juli Rejito, M.Kom³
Computer Science Department, Padjadjaran University, Sumedang, West Java, Indonesia^{1,2,3}
Rifky13002@mail.unpad.ac.id¹, Erick_paulus@yahoo.com², jrejito@gmail.com³

Abstract: Browser game is a game that can be accessed using internet connection and web browser as a platform, one of which is Kantai Collection, Unfortunately, Kantai Collection has a restriction that the game can only be accessed within Japan only. IP spoofing is a method that can be used to change user's location, hopefully, by using this method, user can access Kantai Collection even if the user cannot access Kantai Collection directly from Japan. In this research, we developed a Chrome Extension that can be installed in Google Chrome web browser. The result from this research is that IP spoofing can be used to access Kantai Collection.

Keywords: Kantai Collection, browser game, IP spoofing, proxy server, Chrome Extension.

1. INTRODUCTION

Browser game is a game that can be accessed using internet connection and web browser as a platform. Since a few years ago, browser game popularity has been increasing steadily. This is caused by many factors, such as variation of the games offered by the developers, convenience in accessing browser game, and lightweight requirement because user do not have to store all the game data locally. So, no wonder browser game have their own appeal compared to other type of game.

Unfortunately, those appeal mentioned earlier does not apply to all browser games considering some of them have their own rules set by developer and publisher who involved in the game development, one of which is Kantai Collection. Kantai Collection have a rule that is quite unique on its own, that a user can only access Kantai Collection if they are located in Japan. There is still no official statement by DMM as a publisher on why are they doing this, but this rule causes users who live outside Japan having trouble accessing Kantai Collection.

On the other side, there is a method that can be used and hopefully will solve this problem, and that is by using IP spoofing method. IP spoofing can be achieved by changing the user's IP address so that the user is being viewed as connected to the webserver from another location.

In the past, IP spoofing has been used as a method to change the user's location so that the user can be viewed as connected from another location. But the problem is, some of the current solutions have issues, such as delay when opening the application as well as using it [1], confusing setup, and obligatory to install standalone application which has confusing installation process [2]. One of the example is Tor which can guarantee anonymity but also has some drawbacks mentioned before. In this research, we are going to develop a Chrome Extension that can be installed on Google Chrome web browser. Hopefully, with this Chrome Extension, user can access Kantai Collection webserver using IP spoofing method to change their location without issues appeared on previous solutions.

This research's purpose is for science development only and to proof that Kantai Collection can be accessed using IP spoofing method. This research is not meant to be replicated especially for activities that are considered exploitation nor sabotage.

2. LITERATURE REVIEW

In this section, we are going to present literature review related to Kantai Collection, Chrome Extension, IP spoofing method, and technology used to develop Chrome Extension.

Kantai Collection, or often abbreviated as Kancolle, is a browser game developed by Kadokawa Games which launched in 23 April 2013 [3]. As of April 2015, this game have 3 million registered players and only available in Japan [4]. This game is applying GamiMedia Model that was developed by Tatsuo Nakajima and Mizuki Sakamoto in their article The GamiMedia Model: Gamifying Content Culture. In this article they explained that the media in the virtual world expands to the real world and vice versa, especially in Japanese contemporary culture such as comic books, animation, and games [5]. This can be proven by taking a look at the design of every characters in the game which is anthropomorphism based on the Second World War naval ships portrayed as girls called “kanmusu” (艦娘).

Chrome Extension is a software which can modify and increase Google Chrome functionality. Chrome Extension can be developed using HTML, CSS, and JavaScript [6]. Chrome Extension first launched in 8 December 2009. Chrome Extension have some advantages over standalone applications, relatively easier development and management without sacrificing Google Chrome performance is one of their selling point [7].

IP spoofing is a method to change user’s real IP address with other IP address, so that the user is being viewed as accessing the content from another location. IP spoofing has some usages such as hiding user’s identity [8] and censorship circumvention [9].

Proxy server is a server that acts as an intermediary between client and server. When client asks for services from the destination server, proxy server become intermediary between those two so that user is not directly connected to the destination server [10].

Hypertext Markup Language or often abbreviated as HTML is a programming language used to create a web page. HTML is used to describe the structure of the webpage that is going to be represented to the user so that the web page can be represented well [11]. HTML documents consists of elements called tag. Usually, tags are always come in pairs, starts with opening tag and ends with closing tag.

Cascading Style Sheets or often abbreviated as CSS is a language that can be used to describe how the web page is going to be shown to the user, such as font color, font style, background color, and layout of every elements. CSS differs from HTML in a way that HTML only represent the structure without representing how the page is going to be shown to the user [11].

JavaScript is a scripting language that can be used in conjunction with HTML and CSS as the triad of technology used by most developers in developing World Wide Web based content. JavaScript used by many websites and

supported by all modern browsers without having to install additional plugin [12].

3. RESEARCH METHODOLOGY

3.1 Requirement Analysis

Chrome Extension that is going to be developed to access Kantai Collection need various requirements such as user ability requirement, hardware requirement, and software requirement in order to operate properly and without any issues.

1. User Ability Requirement Analysis

User ability requirement analysis is used to determine which user will be suitable for this Chrome Extension. This Chrome Extension is intended to be used by user who already has the ability to use personal computer with Google Chrome installed, and understand the basics of using Chrome Extension.

2. Software Requirement Analysis

Software required to develop the Chrome Extension are:

- a. Operating system which supports Google Chrome
- b. Google Chrome with the most recent update and supports the installation of Chrome Extension.

Brackets or Notepad++ to develop the Chrome Extension

3. Hardware Requirement Analysis

Hardware required must fulfill the requirement in order to operate the Chrome Extension properly. Minimum requirement for the Chrome Extension to operate properly:

Personal Computer

- a. Processor : Pentium 4 or later
- b. RAM : 2 GB
- c. Architecture : 32 or 64 bit
- d. Hard Drive : 40 GB
- e. Input device : Mouse and keyboard

3.2 General Design

Generally, this is what the workflow of the Chrome Extension that we are going to develop looks like:

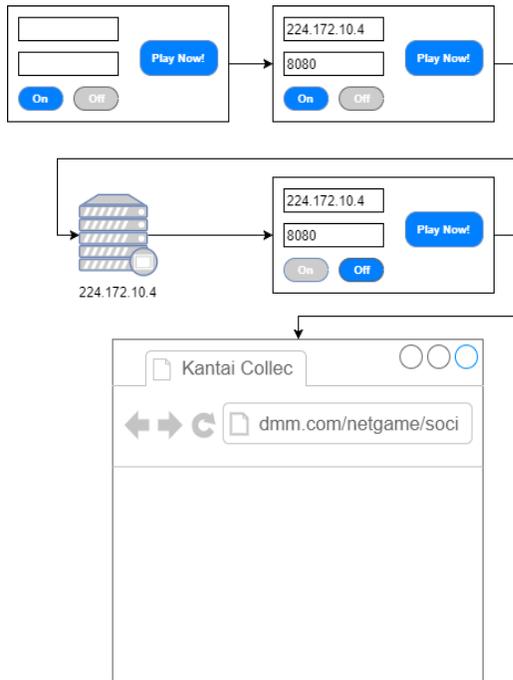


Figure 1: Workflow design for the Chrome Extension (KanChrome)

Based on figure 1, the workflow design for the Chrome Extension that we are going to develop is going to be:

- Run the Chrome Extension that has been installed on the Google Chrome web browser.
- Fill in the textbox with the identity of the proxy server.
- After filling in the textbox with the proxy server's identity, click the "on" button to activate IP spoofing.
- If the Chrome Extension is turned "on". Press the "Play Now!" button to start the game.
- The game can be played if the user used valid proxy server.

3.3 System Design

Chrome Extension that is going to be developed is going to be named "KanChrome" and will be installed on Google Chrome web browser.

Figure 2 explains the use case diagram that is going to be used as reference for the KanChrome development.

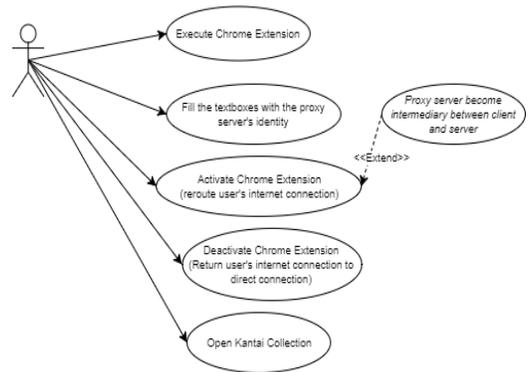


Figure 2: use case diagram used as reference for KanChrome development

Figure 2 explains what kind of activities the user could do on KanChrome. User could do 5 activities in total, running KanChrome, fill in the textbox with the proxy server's identity, activate the IP spoofing, deactivate the IP spoofing, and start the game by pressing the "Play Now!" button.

3.4 Testing Design

KanChrome is going to be tested by using black box testing method. Black box method is a method that only observe the result without looking at its internal codes.

There are 4 functions in KanChrome which is going to be tested using black box testing, the functions are as follows:

- IP spoofing method successfulness.
- Accessing successfulness.
- Response time needed to contact Kantai Collection webserver.
- Load time needed to load Kantai Collection.

4. RESULT AND DISCUSSION

4.1 System Implementation

IP spoofing method which used to access Kantai Collection was done by using KanChrome which developed using Brackets in HTML, CSS, and JavaScript programming language.

Implementation environment is where KanChrome was implemented. KanChrome was implemented in Lenovo Y410P notebook device which has Microsoft Windows 10 operating system and Google Chrome version 58.0.3029.110 installed.

KanChrome only has one page for its interface, that single page offers everything KanChrome needs, such as textbox to input proxy server’s identity, buttons to toggle its status, button to access Kantai Collection, Current KanChrome Status, and a dropdown box containing a list of recommended proxy servers. For more details regarding the interface, take a look at figure 3.

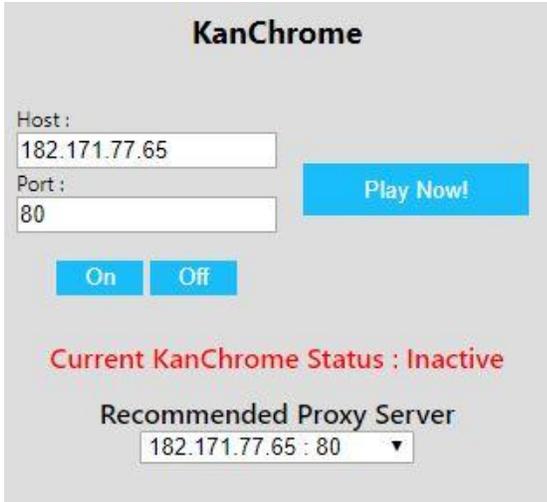


Figure 3: KanChrome main interface

KanChrome’s IP spoofing works by taking advantage of Chrome API developed by Google, by using the chrome.proxy API, now KanChrome is able to override Google Chrome’s proxy setting and reroute the data to the proxy server assigned by the user.

The steps necessary to access Kantai Collection using KanChrome is as follows:

- 1) Open KanChrome that has been installed on Google Chrome.
- 2) Fill the available textboxes with the proxy server’s identity
- 3) Activate KanChrome by pressing “on” button
- 4) Start the game.

4.2 Testing

Testing KanChrome was done in order to determine if the developed Chrome Extension have optimal performance or not.

Black box testing was done gradually. The result from each test is shown in the following table:

Table 1: Black box testing result

No	Testing Class	Observation Results	Conclusion
1	IP spoofing method successful	<ul style="list-style-type: none"> • Not every proxy server can be used/not every proxy server is valid • Every valid proxy server can be used in IP spoofing • Not every Chrome Extension compared with KanChrome works as intended. • The other Chrome Extensions have some limitations such as limited proxy server selections. 	Test Successful
2	Accessing successful	<ul style="list-style-type: none"> • Every proxy server that can be used in IP spoofing can be used to access the game, with exception one proxy server which sometimes showing error message randomly and unpredictable. • Proxy server or any other connection that can’t be used in IP spoofing will cause the server to redirect the user to a page which tells the user that the game cannot be accessed from user’s current location. • Every Chrome Extension compared with KanChrome that can perform IP spoofing successfully, can be 	Test Successful

		used to access Kantai Collection, such as ProxyGO – Hide My IP	
3	Response time needed to contact Kantai Collection webservice	<ul style="list-style-type: none"> • Response time needed depends on the proxy server quality • In general, using proxy server increase the response time needed. • Not every Chrome Extension compared with KanChrome can be used to contact Kantai Collection webservice. However, when it works, the response time were actually faster and more stable when compared to using KanChrome with free proxy servers. 	Test Successful
4	Load time needed to load Kantai Collection	<ul style="list-style-type: none"> • Load time needed to load Kantai Collection depends on the proxy server quality. • Load time cannot be measured if the IP spoofing fails because the user will be redirected to another page which tells the user that the game cannot be accessed from user's current location. • Not every Chrome Extension compared with KanChrome can be used to load Kantai Collection. 	Test Successful

		However, when it works, the load time needed were actually faster when compared to using KanChrome with some of the free proxy servers.	
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Based on the black box testing shown in table 1, can be concluded that generally KanChrome can operate optimally without any major issues.

We were also comparing KanChrome with other Chrome Extensions to see the advantages and disadvantages in each Chrome Extensions tested in this testing.

Table 2: Chrome Extension Comparison

No	Extension Name	Advantages	Disadvantages
1	KanChrome	<ul style="list-style-type: none"> • Easy to use, simple interface and no options that might confuse some people • Free to use, no limitations and no paid service offered • Can be used with custom proxy server • Direct access to Kantai Collection using button provided 	<ul style="list-style-type: none"> • Relying on free proxy server means unstable and slower connection compared to other Chrome Extensions • No predetermined proxy server
2	Hide My Ass! Web Proxy	<ul style="list-style-type: none"> • Usually faster and more stable 	<ul style="list-style-type: none"> • Can only use predetermined proxy

		<p>than the most free proxy server</p> <ul style="list-style-type: none"> • Free to use with some limitations, offering paid services 	<p>server, no option to use custom proxy server</p> <ul style="list-style-type: none"> • No japan proxy server in free version, can't be used to access Kantai Collection • Involving options that might confuse some people
3	Proxy for Chrome	<ul style="list-style-type: none"> • Free to use with some limitations, no paid service offered • Can be used with custom proxy server 	<ul style="list-style-type: none"> • Every proxy servers in this Chrome Extension cannot be used, always returns error when trying to load a page • Involving options that might confuse some people
4	Proxy GO – Hide My IP	<ul style="list-style-type: none"> • Free to use, no limitations and no paid service offered • Handful of proxy server choices available • Easy to use, with simple interface and no options that might confusing 	<ul style="list-style-type: none"> • User must be logged in to use the Chrome Extension • Randomized proxy server. Sometimes, Japan proxy server doesn't appear on the list • Can only use predetermined proxy server, no option to use custom proxy

		<p>for some people</p> <ul style="list-style-type: none"> • Usually faster and more stable than the most free proxy server 	server
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Based on comparison shown in table 2, can be concluded that while other Chrome Extension could have better performance compared to KanChrome, sometimes they cannot access Kantai Collection at all caused by limitations in the Chrome Extension itself.

5. CONCLUSION AND FUTURE WORKS

Based on development and implementation done in the previous sections, can be concluded that:

1. Kantai Collection can be accessed using IP spoofing method
2. Average response time needed when using proxy server increases when compared to using direct connection.
3. Other than what kind of internet connection was used, the quality of the proxy server also affects performance, especially when loading the game.
4. Not every proxy server can be used, user have to search for their own proxy server that is reliable so that the user will not have to deal with problems when playing the game.
5. Not every proxy server works with every ISPs.
6. Chrome Extension that was compared to KanChrome has some advantages and disadvantages. The advantages are the proxy servers provided by the other Chrome Extension have better quality than the free proxy server used with KanChrome. The disadvantages are some of them requires the user to register, limited features, limited proxy server selections, and some of them are paid services in order to be able to enjoy every features.

As for future works, here are some suggestions on what could be improved on the next research:

1. Use other methods. Such as GPS spoofing, editing browser cookies, or WiFi Geolocation to access the game.
2. Use IP spoofing to access different types of content.

3. Use different tools to do IP spoofing such as Virtual Private Network or SOCKS proxy server.
4. Use paid proxy server or free proxy server with high reliability and stability in order to reach certain desired stability in every testing.
5. Add more features involving other Chrome API such as warning when proxy server cannot be used, save proxy server profiles, and improvement on user interface where necessary.

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