DNSBL for Internet Content Filtering Utilizing pfSense as The Next Generation of Opensource Firewall

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Abstract—The internet at this time has become an important part of everyday life. From an early age, children already introduced to a digital environment and used to use internet connected devices for various activities such as learning, entertainment, have a chat with family and friends. Apart from convenience and benefits, the Internet also poses a threat to children and adolescents, from inappropriate content such as pornography, violence, narcotics culture, exposure to online pedophiles or dangerous behavior that can make children unsafe. The role of parents in monitoring the online activities of children and adolescents becomes very important. The market offers a variety of control systems for parents who can block or filter content, manage usage, monitor activities, set boundary lines, and quota. This research was conducted to collect basic information about several sites that are often accessed by children with the aim of implementing an internet content screening program utilizing DNSBL and pfSense to increase parental awareness of various technologies that can be used to protect children from the dangers of cyberspace, providing various information for parents of tools that can protect children, and as a form of socialization about the importance of children internet usage monitoring by parents. The study was conducted in the city of Sukabumi by using 30 respondents who were parents of children aged 3-11 years. The most accessible site for children in the city of Sukabumi is Youtube. Therefore, preventive measures are needed to reduce the negative impact caused by filtering content.

Keywords: DNSBL, pfSense, Filter, Website.

I. INTRODUCTION

Information can be considered as a message contained in a data where the message can be processed into knowledge [1]. Public information is disclosed or disseminated without any limitation on content, audience, or publication time [2]. Access to excess information given to users will result in deviation outside of the actual interests [3]. Financial and security associated advantages are both offered by cloud storaging. In the perspective of financial, cheap maintenance cost of the cloud’s virtual resources system are more popular than dedicated physical resources systems that are associated with every workstation and networks. On the security side, the cloud offered secure archives storaging which reduces accidental erasure or hardware crashes risks that can damage the archives, mainly because a different method is implemented by the cloud which is duplicating and storing it in multiple physical platforms; even when this method duplicated much more copies of the archives, the cloud will always function as normal even if one or more physical platforms go offline. If one physical platform crashes, the cloud will duplicate the archives on other physical platforms in the cloud. The internet become the one of many methods to access the information or archives stored in a cloud [4].

The internet is an easy place to find various kinds of content that is free and always available. The internet is a global computer network system that is interconnected and uses an internet standard protocol (TCP / IP) to serve billions of users worldwide [5]. Sites that are created on the Internet are generally for good purposes, namely improving the standard of living for various needs, both economic, social, culture, information, politics, and others. The internet is like two sides of the same coin, which there are also a lot of sites that are considered to display negative contents such as pornographic content [6]. The number of radical and pornographic sites in Indonesia is currently growing rapidly. Until 2019, the Ministry of Communication and Information (Depkominfo) has blocked around 773,716 radical and pornographic sites, but the number of sites that have not been detected is still very large [7], not to mention sites created by individuals.

Information are expressed freely in many ways on the internet which has a very large platform, with the possibility of expanding the reach of pornography that can shape children's behaviour, including sexual violence [8]. Harassment or sexual violence in children occurs in many forms, can be either direct or indirect physical contact such as through speech. One of the causes of sexual violence in children is the presence of pornographic media [9]. Studies have shown that violence in media encourages children to develop a lot of violent behavior and aggression. Violent scenes, pornography, crime, violent games and other inappropriate content displayed on internet sites encourages children to engage themselves in sexual violence and non sexual violence. [10]. Based on facts sourced from the
Integrated Service Center for Women and Children Protection (P2TP2A) in the city of Sukabumi, there were 194 cases handled by violence department from January to September 2018. The most dominant cases involved sexual violence against children, which reached one third of the total cases handled by P2TP2A in Sukabumi City [11].

Smartphones serve as the main device children uses to access the internet and is more than a mobile phone that offers more advanced computing ability and connectivity than a basic current mobile phone does. Unlike their predecessor which are produced as finished goods, a smartphone enables the users to customize their smartphones to add and delete hundreds of applications according to their needs. Various applications allows their users to personalize the interface itself. Smartphones users can access the internet freely regardless of time and location. With these ease of access to information the users are entering an era of information age [12]. Children in Sukabumi have been introduced to smartphones since an early age which is now part of their daily lives.

The children risk of exposure to unfiltered internet contents will increases and impact their relationship with their families and friends. Internet Content Filtering (ICF) is a mechanism designed to control online activities through filtering and blocking certain parts or internet features that are considered dangerous and unsafe for internet users. ICF is also used as a tool and security feature for managing traffic information based on user or network requirements, such as websites, search words or online communities [13-14]. All restrictions by filtering content function is based on several combinations of domains, IP addresses, keywords, and files. However, the number and spread of content on the internet that continues to grow so fast, encourages the need for better system updates.

The content filtering system starts adding several elements, such as a list of domains (website address), IP address (where the website is) and some content elements (triggers words, phrases, file types, etc.) [15]. Filtration of internet content mostly targets teens and minors. Several ways to implement internet filtration such as blocking connections to a particular site and filtration of search keywords and others [16]. The limitation of this information is done by intervening in the list. The system will receive permissible lists (filtered content and only allow previously approved content) and reject blacklisted list (blocking inappropriate content previously specified) [17]. Internet content filtration can be used to limit the use of the internet as an effort to prevent child sexual violence, increase parental awareness of various technologies that can be used to protect children from cyber dangers, provide information for parents about tools that can protect children, and as a form of socialization about the importance of monitoring children by parents on the use of the internet using smartphones. Figure 1 shows how internet filtration server works.

**II. RESEARCH METHODS**

The study was conducted in the city of Sukabumi in May 2019. The type of research conducted was group observation and the facts collected was qualitative. Facts was collected through interviews and questionnaires to respondents. Figure 2 shows the questionnair used in this research.

Respondents in this study were parents of children currently enrolled in play groups and elementary school aged 3-11 years in the city of Sukabumi with a total of 30 people. Respondents were selected by purposive sampling which represented children from the age of 3-11 years (play groups to elementary school). A summary of the research methods carried out is listed in Table 1 below:
TABLE I. SUMMARY OF RESEARCH METHODS

<table>
<thead>
<tr>
<th>Research Methods</th>
<th>Description in Research</th>
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<tbody>
<tr>
<td>Population Target</td>
<td>Parents of children currently enrolled in play groups and elementary school aged 3-11 years</td>
</tr>
<tr>
<td>Sample Size</td>
<td>30 Parents of children currently enrolled in play groups and elementary school in the city of Sukabumi</td>
</tr>
<tr>
<td>Questionnaire</td>
<td>Questionnaire for parents of children related to sites that are often accessed by children</td>
</tr>
<tr>
<td>Time for Facts Collection</td>
<td>May of 2019</td>
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</table>
A lot of lists are available and maintained by opensource groups or computer networking communities this is the recommended method for adding the lists because of the ease of use and a big database of known bad sites such as shown in figure 6.

DNSBL can also block ads that contains inappropriate contents for a children in youtube by blocking the ads server providing the ads. DNSBL requires a platform for it to manages the traffics such as pfSense. Figure 7 shows pfSense main dashboard.

pfSense is a FreeBSD-based operating system which is designed to be used as a firewall and router. Besides being reliable, flexible firewall and routing platform, this includes a long list of related features and package systems that allows further upgrades and limiting security vulnerability potential [21]. pfSense in a filtering terms needed to become a firewall [22]. Firewall as a collection of components or a system that is placed between two networks and possesses the following properties:

a) All traffic from inside to outside, and vice-versa, must pass through it.

b) Only authorized traffic, as defined by the local security policy, is allowed to pass through it.

c) The firewall itself is immune to penetration.

Figure 8 shows as a firewall pfSense is capable to reroute traffics that contains blocked sites to a virtual IP address which is a DNSBL error page. Not only working in an active browser DNSBL also works in restricting sites or application that run a background material request to trackers or ads servers.

With DNSBL maintaining the DNS port there is no need to configure anything on the clientside as long as the clients is at the same network as the pfSense. Figure 9 shows name server lookup for pornhub.com as the test domain.
With the fast growing of bad sites on the internet therefore there is a need for control or preventive measures to reduce cases of sexual violence in children caused by bad content found on sites accessed by children. One of the preventive actions that can be taken is by content filtering from the sites that are accessed.

IV. CONCLUSION

Based on the results of the research conducted, the site that is most accessed by children in the age range 3-11 years in the city of Sukabumi is Youtube followed by Instagram and Facebook. The existence of some inappropriate content on Youtube and other sites that have the opportunity to be accessed by children, requires parents, school, internet service providers, and government to be sensitive and able to take preventive actions by monitoring or filtrating content accessed by children.

REFERENCES