

# Personal Portable Proxy on a USB Flash Drive

Kaoru Azumaya, Shiori Sato, and Manabu Okamoto

**Abstract**—In this paper, we propose a personal portable proxy server that offers various functions from a USB flash drive. With the rapidly growing volume of data generated by applications, managing that data becomes a problem. A USB flash drive can help us manage data easily, because we can carry any data and any application anytime on a USB flash drive. Therefore, we propose an intelligent personal proxy server with personal functions on a USB flash drive. This intelligent proxy provides convenient features, such as content filtering, history sharing, phishing prevention, and especially automatic form completion. We also propose using the proxy to exchange personal information safely and efficiently.

**Index Terms**—Portable browser, proxy, anti-phishing.

## I. INTRODUCTION

As we increasingly generate various types of big data, managing that data becomes an issue [1]-[4]. At the same time, the capacity of USB flash drives becomes greater; therefore, almost any data can be conveniently stored, easily transported, and safely managed [5], [6].

In this paper, we propose a personal portable intelligent proxy server on a USB flash drive. This local HTTP proxy server provides portable services through a browser, thereby adding convenient functions to the client-server connection, including intelligent proxy functions, such as anti-phishing schemes (as a personal URL filterer), history archival, single sign-on (as an identity verifier), and especially automatic form completion (as an attribute provider).

We often fill in forms online. To sign up for a service, we may need to enter a name, address, or telephone number. Doing so can be inconvenient, especially if the information is the same every time.

Many browsers, including Firefox, provide auto-fill software or add-ons that can be installed on the client PC [7]. However, the software or add-on must be installed on every client we use.

We can also provide personal information through the personal proxy on the USB flash drive, thus the proxy serves as an attribute provider.

## II. PORTABLE BROWSER

Most users want to use a browser in the same environment consistently so that the same bookmarks, histories, and cookies can be used at any time. For example, when using a public PC or when sharing PC, we cannot use our own

bookmarks, cookies, and IDs/passwords that the browser recorded.

To address these problems, a portable browser [8] installed in a USB flash drive has been proposed. Instead of using the browser installed on a public PC, the browser on the USB flash drive can be used, along with the bookmarks, histories, and cookies on the USB flash drive. In addition, user names and passwords saved in the browser are also readily available. Only the CPU and network connection on the host PC are used, while applications and personal data are accessed from the USB flash drive. Fig. 1 presents a diagram of this portable service.

However, portable browsers can have issues. For example, if multiple browsers must be simultaneously used, each of the browsers would need to be installed on the USB flash drive, which would require a larger drive. In addition, when applications are used from a USB flash drive, the Windows registry of the host PC could be changed. Moreover, if the USB flash drive is lost or stolen, all the data is likewise lost or stolen and possibly compromised. A found or stolen USB flash drive can be connected to any PC, and the browser with the storied history, cookies, user names, passwords, and other personal credentials can be exploited.

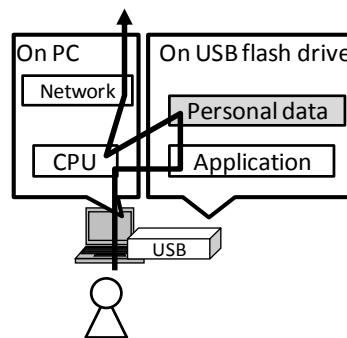


Fig. 1. Portable service.

With the proposed personal portable intelligent proxy, the browser on the host PC is used; however, personal data is accessed through the proxy in the USB flash drive.

## III. PROXY ADVANTAGES

A proxy server functions as an intermediary for requests from clients connecting to Internet services, such as the web, from firewalled networks, such as those at work or school. When a proxy is used, only the browser must be configured. We made the proxy server more intelligent, portable, and personal for the following reasons:

- 1) Proxy servers can be set up on USB flash drives, because proxy applications are relatively small.
- 2) Any browser can be used.
- 3) A proxy server functions as a “third party” intermediary,

Manuscript received October 16, 2013; revised February 14, 2014.

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and new business opportunities can occur in that tertiary zone.

- 4) Proxies are easy to use. After configuring their browsers, users can employ the services without further consideration.
- 5) An intermediary can add various functions to HTTP services. For example, a proxy can add, cut, or change the URL or HTML, while storing browsing history.
- 6) A proxy can serve as a gateway and determine whether a user can connect elsewhere through it. It can stop the session. It can also act as an identity service on a gateway by providing, on behalf of the user, the user's identity or attribute data to any other service.
- 7) As a secure intermediary, a proxy can serve as an attribute provider to hold personal data and other user attributes and to provide them to other services with the user's permission. In particular, a proxy can automatically add attributes to an HTML form, so that users would not need to input their personal data, such as name and contact information, into new forms.

HTTP server software, such as XAMPP [9], is approximately 300 MB and can easily be installed on and launched from a USB flash drive. Therefore, an HTTP server can be portable.

Similarly, we can place the HTTP proxy server on a USB flash drive and make it an active proxy server, which is available only to the owner of the USB flash drive. The user simply connects the USB to a PC and launches the HTTP proxy server software. The proxy server can be easily appointed as the localhost (127.0.0.1); therefore, we do not need to search for the IP address of the proxy.

#### IV. INTELLIGENT PROXY

To enhance the function of a portable proxy, the proposed intelligent proxy basically serves as an HTTP proxy with additional convenient functions. Fig. 2 illustrates the concept of an intelligent proxy.

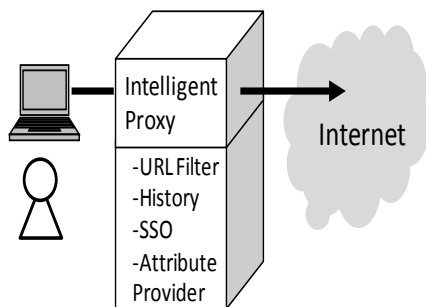


Fig. 2. Intelligent proxy.

Users need credentials to launch the intelligent proxy on a USB flash drive. Users can store personal data on the intelligent proxy and configure functions based on their preferences. Fig. 3 depicts an intelligent proxy on a USB flash drive. We also assume that all personal data, including passwords, would be secured by the proxy software, which uses encryption or hash functions. In addition, a proxy on a localhost does not need to keep the session, because only one user uses it.

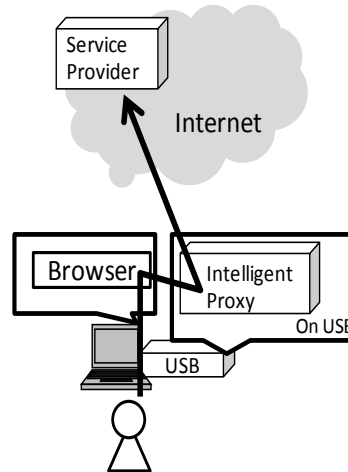


Fig. 3. Proxy on a USB flash drive.

#### V. PROXY FUNCTIONS

##### A. URL Filter

Almost all proxy software applications have a URL filter function to check the URL or the HTML body. If the URL or the HTML body appears malicious or otherwise not acceptable for users, the intelligent proxy on a USB flash drive can be used as a personal filter anytime anywhere.

Personal filtering is also an effective anti-phishing tool. A user can add newly found phishing sites to the filter.

##### B. Case Study

An example is a user who views a specific website from home and must depart before completely reading the page. After leaving home, the user may want to access the same website from a portable device; however, the URL may be too long for the user to memorize.

A personal portable intelligent proxy could easily provide the user with their personal browsing history. The user could simply access the intelligent proxy, verify the recent history, locate the given site, and connect to it with the portable device.

##### C. Single Sign-on

The intelligent proxy can be used as an identity provider (IdP) for single sign-on (SSO). SSO is a mechanism whereby a single action of user authentication enables a user to access multiple web services without needing to enter multiple sets of credentials. The standard SSO techniques are OpenID [10] and SAML [11]. Users are authenticated once by the IdP. When the user accesses the service provider (SP), the IdP issues an SSO assertion to the SP, and the SP then confirms the user's identity.

An intelligent proxy can be used as an IdP. Users must log into the intelligent proxy when they connect to the Internet; therefore, using the proxy authentication is convenient and effective. (See Fig. 4).

In the existing SSO method, the SP needs to find an IdP. If multiple IdPs are available, an IdP is difficult to appoint. The SP needs to display the list of available IdPs and allow the user to select.

In our proposed method, the SP can appoint 127.0.0.1 as the default IdP.

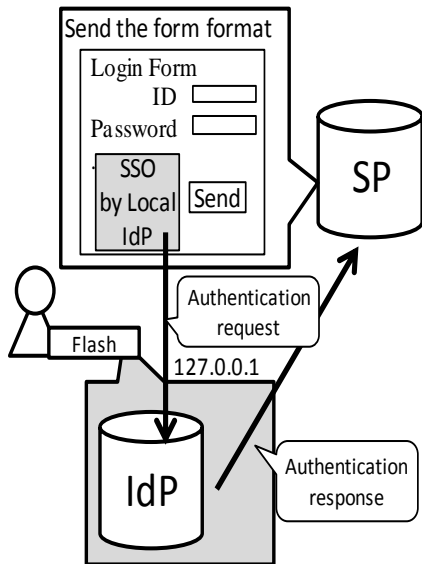


Fig. 4. Single sign-on using portable proxy on a USB flash drive.

D. Automatic Form Completion

When using the Internet, personal data are often required in a form. For example, registering for a service typically requires entering personal information, such as name, address, and/or telephone number. The data entered each time is relatively the same; reentering the same data multiple times is cumbersome.

Automatic form completion software addresses this issue [1]; however, the software application is typically installed on a PC and can only be accessed on the PC.

Both OpenID and SAML propose an attribute provider for exchanging personal data. The OpenID Attribute Exchange is a service extension for exchanging identity information between endpoints and for providing attributes to the relying party.

Some issues need to be resolved. First, personal data are distributed in multiple servers. For example, the user name might be in a blog service and the user address in an SNS service. Therefore, a service provider must look for and access the servers that hold the necessary attributes. The service provider could have difficulty finding the servers if the user does provide that information.

The intelligent proxy is convenient for automatic form completion, because it relays all HTTP content, and the proxy can automatically add any information to the HTML. Therefore, the intelligent proxy can automatically complete the online form with the user's personal information (See Fig. 5).

The proxy cannot change the HTML contents, but it can be used as an attribute provider (See Fig. 6), which receives the request for attributes, fills in the form, and displays the submit button to the user.

All personal data that a user stores in a USB flash drive in the user's possession is less likely to leak out. In the other hand, when an attribute provider on the Internet is attacked, the data stored in it may leak out. In addition, only one attribute provider is used with the proposed method; therefore, a service provider can easily obtain any attribute, especially if the address of the attribute provider is the localhost (127.0.0.1).

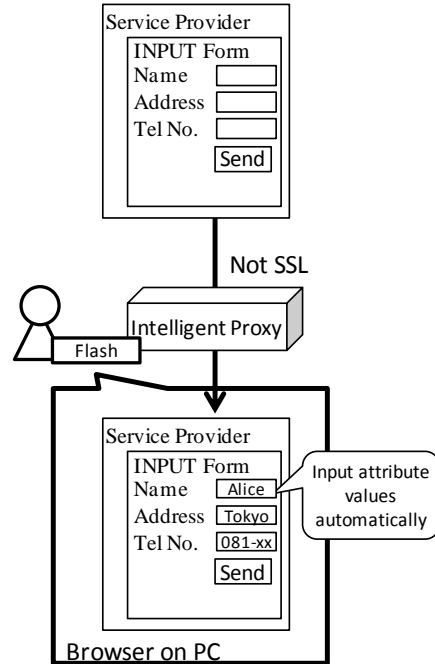


Fig. 5. Attribute provider through portable proxy.

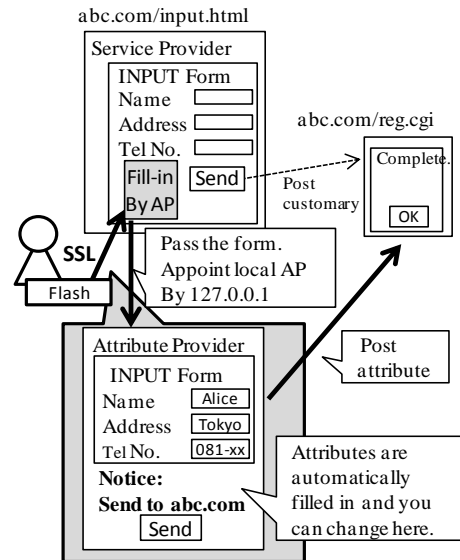


Fig. 6. Portable proxy as an attribute provider.

VI. PERSONAL PROXY ADVANTAGES

Users of the personal intelligent proxy do not need to be aware of the proxy or to install or configure special software on a PC; the proxy automatically provides the available functions. Additionally, if the intelligent proxy is on a USB flash drive, it can be used with any PC, such as a public PC in a hotel business room.

Another advantage of the personal portable intelligent proxy is that the browser does not need to be shared, but the proxy can be. When the USB flash drive is passed to another user, the history from the proxy connection can also be shared. For example, a user may have a job that requires connecting to websites with a browser and submitting evidence of this work. Instead of submitting the browser itself, the user can pass the USB flash drive with the browsing history.

Unlike proxies on the network, a proxy on a USB flash drive requires no maintenance, and basic services can be

provided without incurring costs. Furthermore, while a regular proxy on a network can monitor all connections without transparency, a proxy on a USB flash drive is as secure as the user makes it.

## VII. CONCLUSION

In this paper, we proposed an intelligent personal portable proxy server with portable services through a browser. A portable proxy server enables users to access many convenient and useful functions from a USB flash drive. This proxy is simple to use and is ubiquitous.

In our future work, we will evaluate these systems and their potential in greater detail. Usability, effectiveness, and security will be examined through user-based studies.

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