Browser Session Preservation and Migration

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ABSTRACT

We introduce a *browser session preservation and migration (BSPM) infrastructure* that allows a user to take a *snapshot* of an active web session state on a browser. The BSPM infrastructure allows the user to retrieve the snapshot at a later time on a browser to continue the same active web session on any device. The design of the BSPM infrastructure is based on a *browser-side plug-in* that can capture browser session state, and a *proxy server* that can store browser session snapshots securely for each individual user.

Keywords

Browser Session Mobility, Proxy Server, Personal Mobility

1 INTRODUCTION

Most of the web services found today are session-oriented. Most websites require a client browser to first establish a session and a session ID. This session ID can then be used by a website to track and to identify the client browser as it moves among different web pages within the website. When the client browser exits the website, the web session is closed. This session-oriented model places a limitation such that *for the duration of a web session*, the user cannot switch devices; otherwise, she might lose the current active web session and would need to restart it on the new device. Consider a case when she is running an active web session on a stationary device (a desktop PC), but an alternative mobile device (a Pocket PC with wireless access) is available to her. She would like to go mobile, but she could not do so without losing her current active web session on the stationary device. In other words, she is restricted to the location of her stationary device. Consider another case when she is running an active web session on a mobile device (a Pocket PC) with a small screen, but an alternative stationary device (a desktop PC) with a large screen is available to her. She would like to use the large screen of the stationary device, but again she could not do so without losing her current active web session on the mobile device. In other words, she is tied to the device that she starts a web session with.

To address these limitations, we propose a *browser session preservation and migration (BSPM) infrastructure* that enables a user to seamlessly migrate an active web session to any device that is accessible or convenient to her. Before the user switches out of her current device, she preserves her active web session by taking a session snapshot and saving it on a proxy server. When she finds a new device at a later time, she retrieves the session snapshot from the proxy server and restores it on the new device. Then she can continue with her online activity on the new device. The session migration is easy and effortless for her. This proxy server also allows the user to *keep track* of all her active web sessions-in-progress. The user can freely stop and continue a session-in-progress at any time from any device.

2 DESIGN

The design of BSPM infrastructure is shown in . It contains 2 modules: BSPM plug-in and BSPM proxy. The BSPM plug-in allows a user to perform two basic tasks: (1) take a snapshot of the current browser session and store the session snapshot on BSPM proxy in a secure manner, and (2) retrieve a saved session from BSPM proxy to the browser in a secure manner. The web session snapshot captures a browser running state, including the last page that appears on the browser, values of document objects, values of scripting objects, values that a user enters in forms on the last page, browser history for back and forward pages, and cookies.

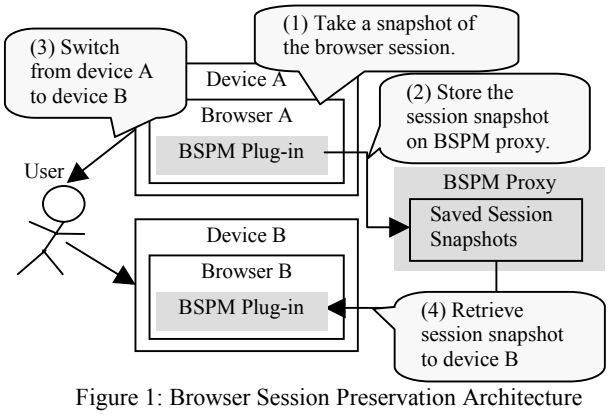

Figure 1: Browser Session Preservation Architecture

BSPM proxy provides an always-connected storage for authenticated users to store session snapshots. In addition, BSPM proxy is also a web host that serves the document displayed in the BSPM plug-in bar shown in Figure 2. By using two basic tasks provided by BSPM, the user can easily

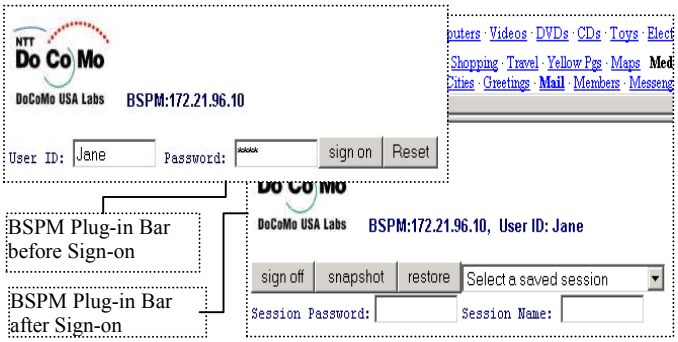

Figure 2: BSPM Plug-in Bar before/after Sign-on

migrate an active web session between two different devices as shown in Figure 1. Prior to leaving the source device (device A), the user takes a snapshot of the browser session and stores the session snapshot on BSPM proxy. After the target device (device B) becomes accessible, the user retrieves the session snapshot from BSPM proxy, and restores it to the browser on the target device (device B).

Before the user can take a snapshot of a web session, she needs to sign-on to the BSPM proxy so that the BSPM proxy can authenticate her. After sign-on, BSPM plug-in allows her to take session snapshots and to restore a session snapshot. For each snapshot, the user can assign a unique *session name* as an index in the list of stored session snapshots. If the user does not give a session name, a default one is generated which is the website hostname. The user wants to restore a session snapshot, she selects it from the list of saved session snapshots in the BSPM plug-in. Figure 2 shows the screen shots of BSPM plug-in before and after sign-on. An assumption in BSPM is that websites do not set short time-out policies that automatically close a session-in-progress with a client browser after the session-in-progress is preserved and becomes inactive. Adjustment of time-out policies is the only modification required on websites. We have created a prototype implementation of BSPM proxy and BSPM plug-in that runs on Microsoft Internet Explorer (IE) Version 5.0 or later. Due to limitation on the number of pages, we will not describe the implementation details.

3 RELATED WORK

Application-layer mobility in SIP [1] shares a similar goal with BSPM. SIP provides *session mobility* that allows a user to change terminals while maintaining a running media session, *personal mobility* that allows other people to address a single user located at different terminals, and *service mobility* that allows a user to change terminals while maintaining access to services. However, SIP is targeted toward telecommunication services, such as video conferencing, voice over IP, and instant messages. In comparison, BSPM is targeted specifically to provide session mobility for web browser applications. Service hand-off [2] in the Iceberg project and Universal Inbox [3] describe architectures that can support personal mobility and service mobility for a user who may want to switch between heterogeneous access networks or between heterogeneous access devices. They deal with issues such as data transformation into different formats that can be accepted by heterogeneous devices, storage and processing for redirecting messages to preferred device that users designate, and heterogeneous device name translation and mapping which may be based on naming schemes other than IP. Like SIP, service hand-off and Universal Inbox are targeted toward telecommunication services. Mobile People Project [4] utilizes Personal Proxy to route communication to a mobile user, independently of the user's location and applications she is currently using. Personal Proxy plays an active role in tracking mobile people's whereabouts, routing application communications, and transforming communication protocol to the preferred devices designated by mobile people. In comparison, BSPM proxy provides a centralized personal data storage specifically for browser session state preservation and migration, rather than a broader range of personal data.

4 CONCLUSION & FUTURE WORK

We describe BSPM infrastructure that brings browser session mobility to users. BSPM enables a user to switch devices in the middle of an active browser session. In addition, it enables a user to preserve multiple active web sessions for restoration at a later time on any device with a built-in browser support. For our future work, we expect such browser session mobility to occur among heterogeneous devices with HTML and non-HTML browsers. The same web document can have different presentations (HTML, cHTML, or WML) on different browsers. As a result, the preserved session state may require transformation before it can be restored on another browser of a different device platform.

5 REFERENCES

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