Chapter XII

Web-Based Smart Card Agent Environment and Applications for E-Commerce

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Issues on usability, security, and mobility have always been the main concerns for e-commerce implementations that aim to gain widespread public acceptance. Smart Card Agent Environment is designed to address these issues by using a combination of software agent and smart card technology. In this chapter, a functional overview of the proposed environment is presented to illustrate how these two technologies can be integrated to offer e-commerce services with high usability, security, and mobility.

To further demonstrate the concept, a prototype implementation of the environment has been carried out. In this implementation, an on-card agent residing in the smart card is capable of storing critical data securely, providing digital ID and signature, and carrying out user authentication. On the other hand, off-card agent would provide various high-level agent services that can be used to carry out e-commerce activities.

Before the end of the chapter, practical considerations for issues on security, technology acceptance, infrastructure availability, and standardization will be discussed.

INTRODUCTION

The development of the Internet has created many new e-commerce activities and transformed many traditional services and information sources into online services. Much effort has been carried out to provide user-friendly access to these Internet-based services. However, interaction with online services still needs enhancement for it to be a

pleasant experience. This is mainly due to the fact that users have not been properly represented for who they are and what they really want, and the lack of a seamless tool that makes them an informed user while allowing actual transactions to be carried out reliably.

Hence, before an e-commerce service is able to gain widespread public acceptance, the following issues need to be addressed gracefully:

Usability – Which includes user friendliness, information availability, and presentation.

Security – Which includes data security, privacy, and integrity.

Mobility – Which includes inherent support for user mobility.

The design of Smart Card Agent Environment represents an effort to close these gaps. Within the environment, software agents would provide system intelligence and information management to achieve high system usability. Software agents that know its user would carry out tasks on information sourcing and filtering to ensure a seamless transaction. On the other hand, portability and security features of smart card would facilitate personalized services and actual transactions to be carried out. Hence Smart Card Agent Environment would assist its users to perform information discovery, organization, and filtering, and serve as a convenience channel to execute tasks and carry out transactions.

The chapter begins with a conceptual overview of the Web-based Smart Card Agent Environment. This is followed by a literature review of smart card technology and software agent technology, where basic smart card architecture, technical background of both technologies, and related research work will be discussed. The next section covers the architecture of the proposed Smart Card Agent Environment and its typical application scenarios. Prototype implementation of two main components, the on-card agent and off-card agent, are presented and issues, controversies and recommendations for Smart Card Agent Environment will be discussed, including, many practical considerations. A subsequent section presents the discussion on future trends and recommendation for further works, and finally the chapter concludes.

BACKGROUND

Web-Based Smart Card Agent Environment

The Internet has realized a connected world with a great degree of openness. The degree of openness for the Internet and its inherent support for user mobility suggests that a reliable user identification process, secured storage media for critical data, and data portability are crucial for any successful Internet-based implementation (Poh & Guan, 2000). On the other hand, information explosion and overload on the Internet suggests that some effective information handling and management tools are required to prevent its users from getting lost in the sea of information and options.

Smart card's built-in cryptography capabilities and high resistance toward tampering have made it an excellent media for reliable user identification and secure data storage. It is indeed an ideal candidate as a 'personal representative' for Internet users. Many applications can be and have been derived from these key features. In the context of e-commerce, smart card represents an ideal media for self-identification, online payment, and secure data storage for sensitive data. Since sensitive data are stored inside smart cards and not within the Internet-connected computers, it is relatively distant from security attacks initiated from a network or the Internet.

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