A Multifunctional Smart Card based Platform to Support e-Government in South Africa

Peter T. Nkomo and Alfredo Terzoli
s200094785@ufh.ac.za, a.terzoli@ru.ac.za
University of Fort Hare Computer Science Department
Private Bag x1314 Alice 5700, South Africa

Abstract- Advancements in technology and the proliferation of the internet have redefined public expectation of government services delivery. Government is being encouraged to look at how technologies like smart cards can be used in enhancing secure and reliable service delivery preferably through the internet. This paper details work in progress, aimed at developing a multifunctional smart card based platform to support online electronic government services in South Africa. This work will be integrated onto the prototype of a simple, cost effective and robust integrated e-business and telecommunication platform to deploy in marginalized communities of South Africa being developed by the University of Fort Hare Centre of Excellence in Developmental e-commerce.

Keywords: e-government, smart cards, developmental e-commerce

1. INTRODUCTION

South Africa is experiencing growth in internet connectivity [1]. An increase in the number of internet users is putting pressure on government to setup twenty four hours per day availability of self service access to government information and services preferably through one-stop online shops. Government adoption of technology in particular web based internet application to enhance citizens’ access to services and to enable citizens to make online transaction is called e-government [2].

The migration from traditional paper based and face-to face service delivery to the use of the internet has the potential to provide citizens with the most convenient way of accessing services [3]. The internet affords government the opportunity to increase its reach to citizens through the provision of an excellent single point of access to government online services.

As transactions become web enabled, citizens demand security, trust, integrity, and privacy of their information and transactions. The web portals are expected to provide strong identification and authorization to resources as well as guarantee individuals privacy. For South Africa, a new automated identification system that cannot be easily forged and used fraudulently has to be developed. Attempts by the government to develop an automated identity card through the Home Affair National Identity System project (HANIS) [4] have brought no major results yet. Attempts began in 1996 but to date no smart card based identity card has been produced. According to the HANIS business plan, the Public Private Partnership (PPP) study undertaken to advise cabinet is expected to undertake contract negotiations for the provision of smart cards from July 2004 to September 2004 [5].

II. MOTIVATION OF RESEARCH

Smart card technology provides an ideal solution to secure personal identification both online and offline. Smart card are small and easy to carry around, yet have enough processing power and memory space to store user information, encrypt and decrypt data using public key infrastructure. To enhance security, they export a restricted application programming interface that limits access to content and functionality [6]. They allow the use of biometric technology to combat identity related fraud. Multiple applications can be bundled in a single card. This provides the necessary convenience people need when they access one stop web portals. This gives the government an opportunity to add new services as per smart card user requirement.

III. GOALS OF THE PROJECT

The aim of this project is to develop a cost effective java card based multifunctional platform to facilitate the delivery of secure e-government services. The project has to prove the feasibility of a smart card based identity card for both online and offline identification based on the proposed HANIS specifications. It also aims at investigating ways in which HANIS can be extended to improve online government service delivery. The card will also be loaded with an electronic wallet to facilitate online micro payments.

IV. DESIGN OF THE CARD

The card has to be sufficiently difficult to use fraudulently. It will augment knowledge based techniques like PINs and passwords with user inherent attributes like finger prints. Finger prints will be used because these are not invasive and this is inline with government design of the smart identity card according to the HANIS specification [7]. Identity information about the user will be stored locally on the secure database hosted on the smart card. For this project two card applets will be developed. These will be the applet containing the user’s identity information, their picture and finger prints. The other applet will host an electronic wallet. Both applets will be put on the same java smart card.
V. APPLET DEVELOPMENT

In the development process, the smart card will be viewed as a remote server running applets defined by an interface [6, 8]. The card applets will be designed as remote objects that can be accessed through the method invocation handled by a proxy object executing at the smart card terminal. This will be done using the java Remote Method Invocation (RMI) interface. The proxy will be responsible for managing communication between the client programs and the card applets. The smart card terminals and the card program will form a distributed client–server system. This removes the restriction that the smart card has to be attached on the same machine as the client program. This will allow and enhance the development of new distributed smart card based application for e-government without worrying about the specific features of smart cards and communication protocols.

VI. WEB INTEGRATION.

The mobility of smart card, coupled with the ubiquitous access of software configurable web browser, plays a paramount role in promoting a truly mobile and interactive e-government information system [9]. The smart cards for this project will be viewed as mobile databases of web enabled applets that have to be accessed by web browsers. Card applets will be made accessible from a web browser by developing a web service interface. Using a smart card reader, one will be able to access identity information on the smart card using a standard web browser via the web service. For example, it should be able to display an individual’s identity details on the browser as per user request and access restrictions.

VII. DEVELOPMENT ENVIRONMENT

Development of a secure multi application platform for this project will be done using free and open source software. Applets that will be downloaded onto the java card will be developed using the java card development kit [10]. The OpenCard framework will be used to develop a common portable interface for both the smart card reader and the applet on the card to guarantee interoperability. The OpenCard framework is defined as an open standard providing architecture and a set of APIs that enable application developers and service providers to build and deploy smart card aware solutions in any OpenCard compliant environment without having to worry about platforms, terminals or smart card specific features [11]. OpenCard framework will also be used to develop services to allow easy and dynamic downloading of applets onto the smart card. This will allow for new services to be added to the same card in future. Java servlet technology will be used to develop the web service for web integration on the Java 2 Enterprise Edition environment [10].

VIII. WORK DONE

The development environment has been set up. An electronic wallet applet has been developed. We are currently developing an applet that will host the user identity information including their fingerprints and pictures. Once both applets are finished, these will be put on the smart card and then offline identification will be tested. We will then develop the web service to allow us to test for online identification and online micro payments.

IX. CONCLUSION

This research project will produce a prototype that can be adopted in enhancing e-government service delivery using cost effective means. This work will also contribute on how the current HANIS project can be integrated in improving online service delivery in South Africa.

X. REFERENCES


Peter T. Nkomo is a first year computer science Masters student at the University of Fort Hare. His research interests include java smart card programming, distributed web services, e-commerce security and wireless networking.