

Deploying Web Services in Rural Communities for Services of Personal Communication Synchronous and Asynchronous

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Abstract – The existence of web services has contributed a lot in improving the ability to exchange and use information over the internet. It has also contributed a lot in the socio-economical development of humanity especially in urban communities. This paper discusses the deployment of web services for rural communities, as one of the Information and Communication Technologies (ICTs) benefits. It also describes the early stage of the development of a localized robust system for personal communication synchronous and asynchronous through the use of web services technologies. This system will be deployed and tested in Dwesa, a rural community in the Eastern Cape Province of South Africa which already has embraced ICTs through a project called the Siyakhula Living Lab.

Keywords- Web services, Synchronous, Rural Communities, Asynchronous, Free and Open Source Software (FOSS).

I. INTRODUCTION

ICTs have been responsible for the multidimensional changes experienced in the world, especially in developed countries [1]. These changes have been observed in the area of economy, education, communications and travel. Web services has been one of the recent technologies that has contributed a lot on how people exchange information and communicate over a network.

This project focuses on making use of the ICTs and the network system already deployed in Dwesa in order to develop communication software that will offer the inhabitants of Dwesa multiple options of communicating with one another and with the world around them. Dwesa's inhabitants still depend on the old way of communication, which is to walk from one place to another to deliver a message or to discuss business. One of the reasons is that many of them cannot afford to acquire the necessary technologies such as a GSM mobile phone. There is need to develop technologies that will provide easy-to-use and affordable communication services for Dwesa.

II. AIM OF THE PROJECT

The aim of this project is to develop and deploy localized system that will operate as a one stop shop where different web services will be consumed from a single interface. The

system will offer services for personal communication synchronous and asynchronous such as Short Message Services (SMSs), Multimedia Message Services (MMS), Instant Messaging (IM), Emails and Voice over Internet Protocol (VoIP). These services will be developed and deployed as web services and they will be consumed over the Dwesa network.

III. LOCALIZED WEB SERVICES IN DWESA

There are many web services that have been already developed and deployed by different internet companies, such as Yahoo Web services, eBay, Amazon e-Commerce services whose services are consumed over the internet [6], but this project focuses on developing web services that will be deployed in Dwesa and consume through the Dwesa local network. The Dwesa network links four schools which are based in four different villages namely Ngwane, Mpume, Mtokwane and Nondobo [2].

At each of the schools there is a local area network (LAN) that allows the local lab and school computer to connect to the lab's server and the lab's router which will route them to the internet [3]. Deploying web services in the main server, which is situated at Mpume, will allow community members from the different villages to consume them through the "raw" network which is also known as the Worldwide interoperability for Microwave Access (WiMAX) network. This will allow community members to keep in touch with friends and families in other villages and also outside Dwesa through the internet.

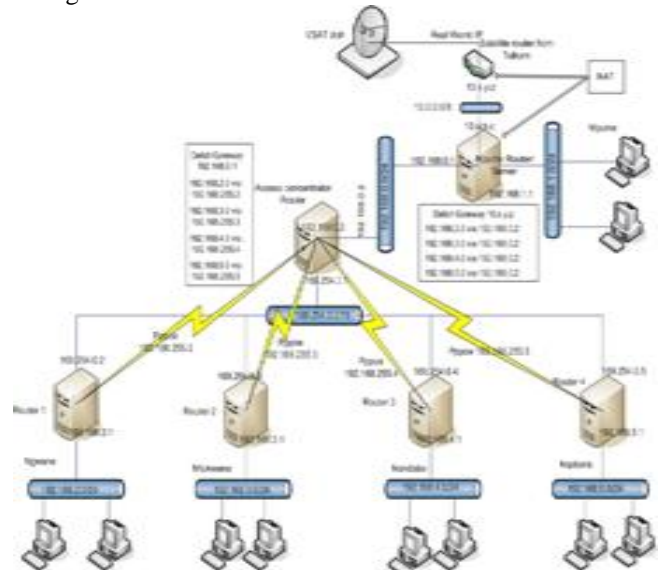


Figure 1: The Dwesa Network [3]

IV. SYSTEM DEVELOPMENT

Web services are modern technologies for exchange of information over the network [4]. Deploying them in marginalized areas can be a big asset. The only challenge that any developer can encounter is developing a simple and user friendly system using the latest ICTs. There are many tools and technologies that can be used to develop synchronous and asynchronous communication services software, but a cost-effective, reliable, robust, user-friendly and freely distributed software system will be the focus of this project. The system will be developed in an open source environment using Linux, Apache HTTP Server, MySQL and PHP (LAMP). The LAMP system is a set of free software programs often used together to develop dynamic web sites or servers [5].

The web services will have an interface described in a machine-processable format called Web Services Description Language (WSDL). The system will also follow a Service Oriented Architecture (SOA), which allows applications within a system to be independent from one another and reusable [5]. There are two different types of web services often used in modern technologies namely Representational State Transfer based web services and Simple Object Access Protocol based web services [6]. This project will focus on developing SOAP-based web services using the SOAP extension that is embedded into PHP and allows developers to write a SOAP Server and a SOAP Client. System users will consume services through a request-response operation between the SOAP Server and SOAP Client over HyperText Transfer Protocol (HTTP) [6]. SOAP follows HTTP request/response model providing SOAP request parameters in a HTTP request and SOAP response parameters in a HTTP response [7].

V. REQUEST-RESPONSE PROCEDURE

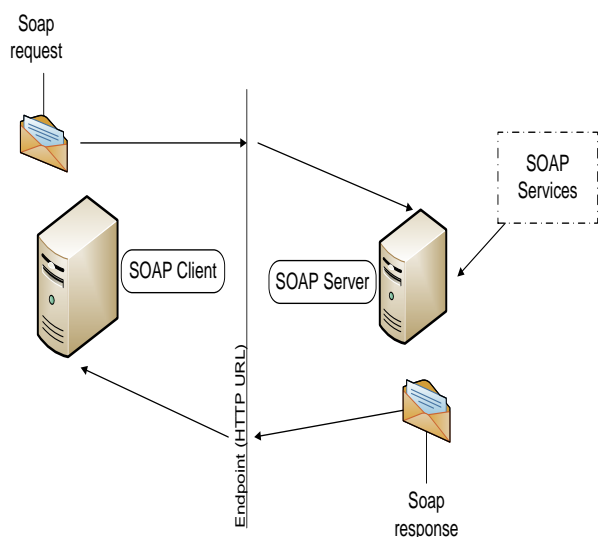


Figure 2: SOAP request-response procedure

VI. WORK DONE AND FUTURE WORK

There is a project already running at Dwesa, known as the Siyakhula Living Lab (SLL) project. It is an ICT platform upon which a number of applications are and will be running. The e-Commerce for SMEs women crafters and the

e-Government services are some of the applications undertaken running. The web services for personal communication synchronous and asynchronous will form part of the existing ICT platform. Research has already been conducted on how to develop a localized system for consuming web services, the cost of the use of the system by community members and the impact of the schools budgets since the system will initially run from the schools.

VII. CONCLUSION

The role of ICTs in the area of communication, in marginalized areas, is very vital because the socio-economical development of those areas depends on it. A successful completion of the system will provide community members to ability to be part of a knowledge society.

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Samalenge J. was born in the Democratic Republic of Congo. He completed a BSc degree in 2007 and a BSc (Hons) in Computer Science in 2007, at the University of Fort Hare and he is currently studying towards an MSc in Computer Science at the same University.