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ABSTRACT

The authors proposed to design and implement a prototype research electronic automated teller machine service using Windows Communication Foundation to study the performance and scalability of implementing Web Service Security policy. The software chosen for building the service are C# programming language, Internet Information Service web server, Microsoft Structured Query Language database server and Visual Studio.NET Integrated Design Environment as development toolkits. To evaluate the different performance metrics, the Windows Communication Foundation Service has been tested by using testing tool Mercury LoadRunner, version 8.1. In this paper, the authors will present the architecture of the service, its testing procedures, and statistical analysis of the system performance.

KEYWORDS
C#, e-ATM, IIS, Mercury LoadRunner, MS SQL, SOAP, WCF, Web Service, WS-Security, XML

1. INTRODUCTION

Web Service paradigm (WSP) offers a set of standards and technologies that an organization can interact with different networks securely. It is a service intended to operate within machines to exchange Simple Object Access Protocol (SOAP) messages over diverse networks (Catalina et al, 2005). Web Service (WS) is a software component comprised of specific business methods that is published, described and invoked over diverse networks using Extensible Mark Up Language (XML) based open standards (Siew et al, 2006). WS is a computing technology that offers interaction and interchange of resources among e-service community and clients (Oladosu et al, 2005). WS normally complies with four standards, such as: (a) XML, the messages are sent over network in an XML format, (b) SOAP, an standard protocol to specify how XML documents are exchanged over Hyper Text Transfer Protocol (HTTP) or Message Oriented Middleware (MOM), (c) Web Service Description Language (WSDL), offers a metadata description of request and response parameters for interfacing, and (d) Universal Description Discovery and Integration (UDDI), the directory where services are registered.
Windows Communication Foundation (WCF) is a technology for implementing, configuring and deploying distributed Service Oriented Architecture (SOA) applications using a set of classes placed at the top of the .NET Common Language Runtime (CLR). The existing different distributed technologies like ASMX WS, .NET Framework remoting, Microsoft Enterprise Services and Microsoft Message Queueing (MSMQ) are unified in one umbrella of WCF. Client can access loosely coupled services through the use of WSDL irrespective of platform from which the service is hosted. WCF supports many advanced WS-Security specifications as WS-Security, WS-Reliable Messaging, WS-Automatic Transaction, WS-Secure Conversation, WS-Trust etc. WCF .NET facilitates the development of distributed and interconnected applications based on SOA (Markus & Bernd, 2010).

WCF has been designed to provide manageable approach to distributed computing, interoperability and service orientation in varied systems maintaining security and reliability of services (Mistry & Khanna, 2011). The WCF service has composed of three components to a simple job of message communication with a client in SOA model, they are: (i) Service Class that implements service as a set of methods, (ii) Host Environment, the service can be hosted in Console Application, Windows Service, Windows Forms Application or in IIS, and (iii) Endpoints, the messages are communicated via service and client endpoints. WCF is a unified technique for design and developing SOA architecture (Mostafa et al, 2012). WCF interacts with other systems using SOAP messages as defined in WSDL, exchanges message using HTTP or HTTPS protocols in XML format, service registry based on UDDI standard is used to publish and discover WCF services (Ahmad, 2014).

1.1. Related Works

The issue of security in WS has been crucial barrier in many application fields that conducts sensitive information. In this perspective Kou Hongzhao (2010), proposed a Security Token Service (STS) in WS and designed STS- based security architecture for WS to provide higher security and higher performance services. The STS-WS is composed of four entities, UDDI, the WS Provider with a STS, the Web Service Requester (WSR) and a Certificate Authority (CA). The CA is used to control and issue certificates to the entities and a trust domain is established from the CA. STS is a authentication server in service layer and it is used to issue, cancel, renew and check security tokens for the WSR in a transaction. Within one group of business shared a common STS.

Markkus and Bernd (2010) elaborated a Service Oriented communication concept using WCF, particularly designed for industrial applications in a production environment of a central Manufacturing Information System (MIS) database. The software solution system implemented service oriented communication concept based on WCF .NET, delivers the important information regarding current manufacturing process in a real time. A supervisor, who operates the software can get detail information like supply order, duty roster etc. This hints them the possibility to compare current production data with the previous shifts and days to be achieved to a conclusion how the production went till now and the machines behave with the current settings and optimizations. All this information gathered from the software application can give a clear picture whether the order’s deadline can be achieved or not etc.

Hou et al (2010) outlined a study on the performance of SOAP processing on Java platform and suggested that WS performance can be improved by optimizing SOAP messages, adopting suitable methods. The XML parsing, de-serializing and serializing are the most time consuming phases during SOAP messages exchanges and that effect the WS performance in a large scale.

Database security policy of E-services is strongly based on the integrated security system. In this perspective, Mostafa et al (2012) illustrated a three-tier security system architecture based on WCF using database security policies. Client tier was used as the graphical user interface (GUI) of the database; Application Server worked as intermediate tier between client and Database server and the Database server is working as repository for storing Supper User Administrator accounts, legitimate user accounts, and Database administrator accounts, etc. The goal of the study was to build a strong security database and provide a harmony between all the participants in the system.
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