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The Academia VPN Information Interaction on Internet and Mobile Media (AI^3M^2) on the Institutional Networking

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***Abstract*– In any society, efficient and effective handling of information is a cornerstone for economic development. In this way, the Academia VPN Information Interaction on Internet and Mobile Media (AI^3M^2), a versatile system which exploits institutional data utilizing the Internet and mobile media for the Institutional communities in the country is envisaged. The AI^3M^2 harmonizes the Virtual Private Network (VPN), Intranet, parser, Integrated Services Digital Network (ISDN)/Digital Subscriber Line (DSL) routers, SMS Server and mobile phone technologies to envisage the most intelligent, efficient, effective, and convenient way of sourcing and outsourcing useful and relevant data for the users. The institutional data reservoir stores heterogeneous information resources ranging from the traditional databases to semi-structured data. The parsers extract the relevant information from the reservoir and transmit them into the router. From the received data, the router performs various kinds of task determined by the application of data. The router converts network transmission data formats as well managing data transfer to the VPN. AI^3M^2 applies a spoke and wheel mechanism to manipulate the heterogeneous instructional data reservoir (hub) under one process. The AI^3M^2 uses a Virtual Private Network (VPN) as a private network which is constructed within a public network infrastructure.**

***Index Terms*– AI^3M^2, AI^3M^2 Graphical User Interface (AI^3M^2-GUI), Parser, Spoke-Wheel Mechanism, Mobile Phone Handset and Virtual Private Network**

I. Introduction

World wide, societies have realised the importance of education and information management as a cornerstone to development. In developing countries, the population increase of candidates in institutions, and lack of adequate infrastructures, such as classrooms and laboratories has limited the enrolment capacities. In some cases, this has left most of the eager and enthusiastic candidates outside the academic circles. In other circumstances, it has lead to over enrolment of classes. This has compelled the education systems, beside the normal academic time to devise a means of sharing teaching/learning materials between candidates and lecturers. In this information era, the availability and affordability of laptops and mobile phones owned by some individuals can be exploited to facilitate interaction in data sharing. In this way, candidates and lecturers can be at their own homes but be able to exchange materials. It is in this view that the AI^3M^2 is exploiting internet technologies such as VPN, router facilities and mobile media like handsets to exchange the information regardless of the location of the targeted individuals. The targeted information users shall use laptops and handsets to access the targeted information. For instance, the lecturer can be at his farm house and be able to send his assignment, tutorial, teaching /learning materials to his candidate through the AI^3M^2 site. Visa vi, the candidates can be at their homes, work place, or remote areas, but they are able to use the portable laptops or mobile phone handsets to access the materials from the AI^3M^2 site.

A. General Characteristics of the Approach

This work aims at presenting a new system called AI^3M^2, which is capable of allowing the users and all stakeholders to access information at a convenient place and time utilising laptops and mobile phone handsets.

The AI^3M^2 is shown in Fig. 1, illustrating its general functional mechanism. In the underlying AI^3M^2 architecture the heterogeneous information sources use different data models ranging from relational, semi-structured, and other sources. The parsers extract the targeted information and pass it to the router. The router converts data transmission formats and transfers data to the SMS providers through VPN and telecommuters. The AI^3M^2 architecture is discussed in detail in the later sections.

II. Related Work

Recently, there has been some work performed about the ways of exchanging, personal, educational, office, etc., materials on remote bases. Some work has been attempted where the user can use the laptop whilst away from the work, residence, and sport premises. Further, research has been conducted on how to exploit the use of mobile phone handsets to access short messages. For instance, the Ozeki SMS is an efficient tool that makes sending and receiving SMS message

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from a computer easy. It uses a GSM phone connected to the PC with a phone-to-PC data cable. The SMS server is connected to the selected database through a standard ODBC connection. Note that the database could be Oracle, Access, MSSQL or any other database engine that has an ODBC driver. The Ozeki server tool normally concentrates on the exchange of data between mobile handsets. The [1] Ozeki SMS Server can send SMS to any mobile device from ASP scripts, where the SMS Server and the ASP scripts can be located on two different computers or the same server. Its server software makes it possible to pass incoming messages to other applications. These applications can send reply messages or they can send outgoing message at another time.

Use In [2] they argue that a global leader in the field of Short Message Services (SMS) has been created by the merger of mBox Limited, Europe's leading SMS services provider and mobilesys Inc., the premier US provider of SMS services to corporations. In [3] they discuss Quios's global mobile messaging, whose network extends to over 450 wireless carries in Europe, Asia Pacific and USA. They outline their product as: Q-700 a SMS Delivery and Billing Service; Q-500 tailored to meet company's needs.

Other SMS service providers are MyAlert.com, which the user can use to send short message to worldwide, and AirCall, which allows the user to send at most three (3) messages daily to any GSM phone.

The above discussed research work tends to concentrate on short messages on the handset. Such a message is inadequate when it comes to exchange of educational information such as teaching/learning materials. It is with this view that the AI^{3}M^2 integrates information from traditional databases and semi-structured data sources with data from the SMS providers/servers. The AI^{3}M^2 allows the user to access the data from the heterogeneous resource reservoir and SMS server, exploiting the affordable and portable facilities like laptops and handsets that are easily managed by users.

III. The AI^{3}M^2 System Architecture

The AI^{3}M^2 in Figure 1, like other systems such as [4], [5] MOMIS, [6] Clio Project, and [7] follows the approach of integrating heterogeneous data that use different models. The AI^{3}M^2 cooperates and harmonizes the technology of heterogeneous databases, Cisco Routers, VPN and SMS Server to form an intelligence system that can handle information of different formats.

The bases of the AI^{3}M^2 are a collection of heterogeneous data sources. These sources use a variety of data models. This study tends to use the frame work of the [8] Semantic Integration (SEMINT) – specific parser, which automatically extracts metadata from the involved sources. In particular, it improves the parser so that it can cater for schemas, flat file documents, and semi-structured data, to mention a few. The extracted data is passed on to the Cisco ISDN/DSL Router.

The AI^{3}M^2 router converts the data transmission formats and transfers data to the SMS providers through the VPN and telecommuters. The router has basic components similar to those of desktop PCs, such as CPU, memory, a system bus, various input/output, etc. In addition, and like PCs it uses an operating system to run software applications. Cisco routers have the Internetwork Operating System (IOS) to run configuration files. In this work, AI^{3}M^2-IOS is built in the routers to handle heterogeneous data of different formats. The AI^{3}M^2-IOS's configuration files controls the flow of information to targeted components such as the VPN, SMS servers, etc.

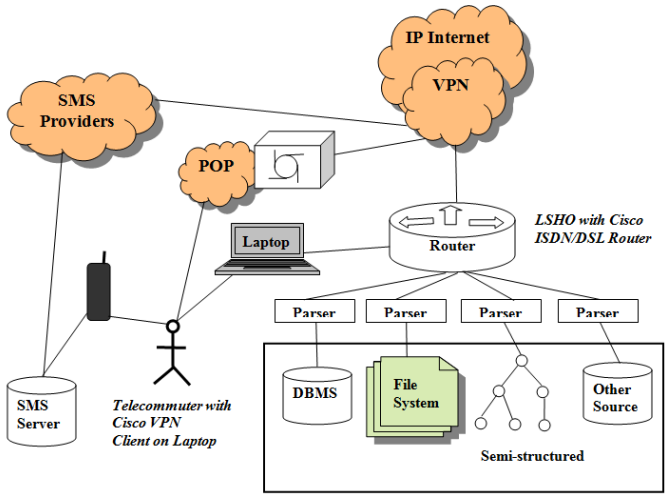

Fig. 1. AI^{3}M^2 System Architecture

The AI^{3}M^2-VPN receives the data from the routers. The AI^{3}M^2-VPN allows targeted institutions to establish end-to-end, encrypted VPN tunnels for secure connectivity for mobile teachers/learners. Thus, the AI^{3}M^2-VPN will offer secure, reliable connectivity over a shared public network infrastructure such as internet where the users will use laptops that are installed with VPN Client. The VPN client supports Windows 98, ME, NT 4.0, 2000, XP, Linux, Solaris, etc.

The SMS server through SMS providers exchange information from router and VPN. The teleteachers/learners using mobile handsets, can access the targeted data from SMS server.

IV. The AI^{3}M^2 Functional Mechanism

The AI^{3}M^2 deals with different data models. Thus, the source is not limited only to the plain text, but it can be extended to other models such as DBMS schemas, Word templates, SAP schemas, semi-structured data models etc. To manipulate such heterogeneous sources, AI^{3}M^2 uses a Hub-Spoke Wheel mechanism (see Figure 2). The HSW mechanism can be illustrated in two ways. First, the heterogeneous sources will remain stored in their mode, and this is referred to as the spoke. Second, during the operation, there may be a need to integrate some different data models as per the user's application demands. Such a central conversion of the heterogeneous sources in this system is referred to as the hub. Hence, the idea portrayed in Figure 2 is

that each different type of the local sources (Spoke) stores its data in its format, i.e. relational, semi-structured, etc. The system then converts the heterogeneous sources to a common format (Hub) to meet the user's application needs. Hence, the AI^{3}M^2 designed to accommodate different types of data models as teleteachers/learners may use different data formats.

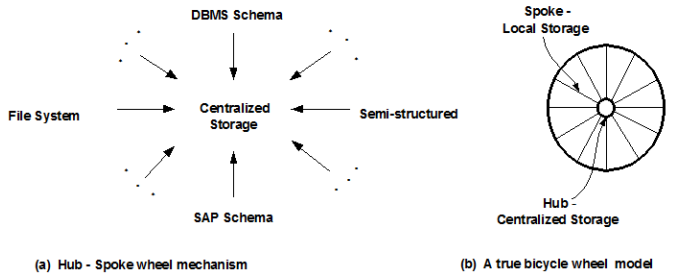

Fig. 2. AI^{3}M^2 Hub-Spoke Wheel Mechanism

V. The AI^{3}M^2 Functional Mechanism

The Figure 3 illustrates the AI^{3}M^2 Graphical User Interface (AI^{3}M^2-GUI) used to run the system. From Figure 3, in the fourth line, there is a combo box which can be scrolled to selected and activate the parsers. At the same time, the user also selects the corresponding source. The process will run for some time, that is, the parsers will read and translate the data and then pass it to the router. At a later stage, the system will prompt the user to state how he/she is connected i.e. laptop or mobile phone handset. Having selected the connectivity type, the process of downloading, uploading and other data manipulation commences.

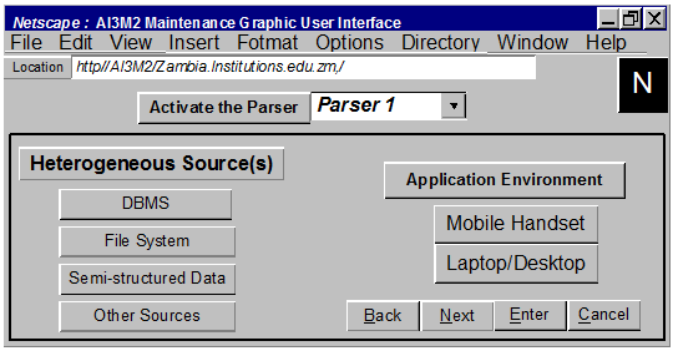

Fig. 3. AI^{3}M^2 Graphical User Interface

VI. Conclusion and Future Work

The sharing of educational materials using the most convenient and portable facilities at the remote position is investigated. The AI^{3}M^2 system exploits affordable facilities like laptops and mobile phone handsets to access educational materials at any convenient time. The AI^{3}M^2 harmonizes the Virtual Private Network (VPN), Intranet, parser, Integrated Services Digital Network (ISDN) / Digital Subscriber Line (DSL) routers, SMS Server and mobile phones technologies to envisage the most intelligent, efficient, effective, and convenient way of sourcing and outsourcing the useful and relevant data for the users.

AI^{3}M^2 uses a Hub-Spoke Wheel (HSW) mechanism that helps to manipulate the heterogeneous sources. The idea is that each different type of data source stores its data in its own format, i.e. relational, semi-structured, etc. The system then converts the heterogeneous sources to a common format to meet the user's application demands.

The user manually selects the parser and the corresponding sources. For the future, this shall be improved such that once the parse is activated, it shall automatically activate the corresponding source.

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