WEB-BASED INFORMATION SYSTEMS : ELEMENTS OF INTEROPERABILITY

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Abstract

The paper briefly explain about Information Systems and its connectivity to the web. As the web based Information systems will share the information from different other systems, there is need to standardize the protocols and other elements. The paper described the various elements and techniques of interoperability such as Metadata standards, Data Integration, System Interconnection and the utility of XML in interoperability of web based information systems.

Keywords : Information System, Interoperability

1. Introduction

Information Systems and Networks are playing a very important role in Education and Research. Faster Communication and interaction and sharing of information is made possible through Web. Now a days, web-based education and research efforts are focused into the standardization of learning metadata schemes, course structures and software interfaces to provide interoperability between applications and learning resources. These systems and networks are also useful for various kinds of organizations and industries.

The main purpose of an information system is to produce information to meet the needs of the users. The successful information system must be capable of carrying out basic data processing functions, storing large amount of information and communicating and disseminating useful information to users. Modern data processing technology has enhanced traditional techniques for producing information outputs and provided new methods for satisfying the information needs of users. Information systems present a variety of concepts and techniques which help to make information outputs more meaningful. The objectives of information system are as under:

1. To explain how filtering data can provide information.
2. To identify and describe the major ways the monitoring method can be implemented.
3. To show how information can be used to highlight key performance activities and identify potential opportunities.
4. To introduce the use of logic-mathematical models as a method for providing information to decision makers.
5. To illustrate, based on the interrogative method, how information is provided.
6. To develop an awareness for the use of information reflecting events and activities external to the organization and the application of the strategic decision center method[1].

There are subject-oriented information systems such as Management Information Systems, Geological Information Systems, Library Information Systems presently popular. With the advent of Computers, Information Technology applications and Internet, more interactive online information systems are designed.

To be effective, an information system, must be interoperable, in the sense, it must be consists of common internet protocols, communication formats, dynamic and have ability to share the content, structure and metadata between various platforms and other Information Systems.

2. Elements of Interoperability

There are no universally accepted standards and techniques for achieving interoperability in a Web based system. Following are a few concepts, which are needed to achieve interoperability in a system.

2.1 System Interconnection

Beyond supporting common communication protocols such as TCP, the most well established aspect of interoperability at the system levels is the use of common directory and security services. There are a number of industry standards to create a single system for user. They are Active Directory, Windows NT authentication, Novell Netware etc. Majority of the Information Systems support integration with these platforms.

2.2 Data Integration and Interchange

To share and interchange information between information systems, there is a need of a set of common specifications and standards. There is considerable movement globally to develop specifications to communicate between systems is a pre-requisite for interoperability, it is also necessary to have common ‘dialects’ by which to share the actual information.

2.3 XML

In 1997, the World Wide Web Consortium (W3C) endorsed the extensible Mark-up Language (XML) as a future standard for data interchange. For the first time ever, we have an internet standard for transmitting data along with its interpretation criteria that is platform independent, programming language neutral, both machine and man readable and is emerging as an industry standard[2].

The XML is an industry standard for capturing and communicating information in a structured way. In essence, it is a “language for creating languages”, where each language is designed to represent a specific information set in an effective and powerful way[3].

2.4 Web Services

Web Services is a name given to a Collection of Specifications for Communication between systems (as well as information storage and retrieval) using XML and Web Technologies. Development in this area is being conducted by the W3C and many software companies.

Specifications such as SOAP, WSDL and UDDI form the core of web services, although there are too many other specifications to list here. Platforms such J2EE and .NET havde also gained wide adoption and these are supported by many information systems.

There is also a move towards “Service Oriented Architecture”(SOE) which aims to simplify the scalability and interconnection of these systems, although this is only seen at the higher end of the market.

Web Services are transactions initiated automatically by a program, not necessarily by using a browser and can be described, published discovered and invoked dynamically in a distributed computing environment. Generally Web Services are having following characteristics:

- Encapsulated. Encapsulated means the implementation of the function never seen from the outside.
- Loosely Coupled. It means a change in the implementation of one function does not require change to the invoking function.
- Contracted. Contracted means there are publicly available descriptions of the functions behaviour, how to bind to the function, it’s input and output parameters.
- Based on Standard Protocols. Standard Protocols are open, wide published and freely available for any one to implement[4].

2.5 Interoperability

The Information System to be effective must be interoperable. In other words, interoperability among vocabularies, in the same language or in different languages, among different classification schemes and between controlled vocabularies and classification schemes. The concern for vocabulary compatibility is not new. Long before the advent of the electronic age, the library and information professionals had explored and employed various methods to reduce conflict between different vocabularies that were used in the same system. Earlier methods relied almost completely in intellectual efforts. As advanced computerized process methods for achieving or improving interoperability emerged, computer technology began to be used to fully benefit from, the networked environment[5].

Adopting Interoperability will help to attain the following objectives:

- Decentralised and interoperable system of information.
- Better, More Cost Effective decision making
- Multi language Capability.
- International co-operation and sharing of related technology, education, research, information and expertise.

3. Application Integration

There have been efforts within specific organizations to develop interoperability standards, driven by the nature of the information use. The most visible activities relate to the syndication of news and the sharing of electronic learning information. Organizations should look their specialization and need to determine the useful standards for their domain.

Among the different standards, Rich Site Summary (RSS) has become the de facto standard for syndicating and republishing the information. This is increasingly deployed in large scale solutions and is useful for Content Management Systems.

There are also complementary standards such as NewsML, which is typically used by the larger media organizations for the interchange of the integrated information as well as for the broader management of news throughout its life cycle.

Further, there has been considerable activity around the development of Electronic Learning standards for sharing and re-packaging the information. This has produced specifications such as SCORM (Sharable Courseware Object Reference Model), which is designed to allow for the creation of re-usable learning objects that can be used in different systems and organizations. The IMS Global learning Consortium has also developed a range of Specifications to support interoperability between different Information Systems.

There are a number active standards relating to the structuring and Classification of Content including:

- Resource Description Framework (RDF)
- Topic Maps (XTM)
- Exchangeable Faceted Metadata Language (XFML)
- Outline Mark-up Language (OML)

These provide a range of ways to structure information and are valuable tools for interchange of information systems.

4. Digital Rights Management

While designing an information system, one must be aware about difficult issues concerning Intellectual Property Rights (IPRs) and the Web. 'The Web is a network of information; as such it is also a network of intellectual property. All information that is made accessible on this network is by default published within some IPR Context, in which relationships between those items and parties (such as creators, publishers and consumers) have been defined in some way, either implicitly or explicitly. The manifestation of those relationships in terms of specific items, parties and actions can be thought of as an IPR policy[6].

The IPR Policy related to the Digital Rights are clearly defined in the Policy and Rights Expression Platform (PREP) and these are the recommendation of W3C Workshop in January 2001.

5. Metadata Standards

Metadata is information describing information or data. A source information (document) or raw data can be described by a set of attributes (For Example, title, subject keywords, data of publication etc.) This type of information is known as metadata[7]. It is collected in a standard format to facilitate query and consistent presentation across participating systems.

There is a need to develop a universally accepted standard for storing metadata. Several major organizations have already adopted the following Z39.50 (an ISO approved search and retrieve communications protocol compliant metadata standards: Dublin Core, GILS (Government Information Locator Service), FGDC (Federal Geographic Data Committee). Any of these standards can be used by the national nodes, without any effects on interoperability since they are all subsets of each other.

The goal of Information System is to provide individual users and collaborative research groups with a uniform and integrated access to a large collection of heterogeneous data. The major hindrance in

creating a respective infrastructure is to integrate relevant data stored at different sites and encoded in different formats.

To overcome this difficulty, there is need to develop and standardize the web protocols, information policy and strategies, information storage formats, ontology and software used in the information system, so that every information system must be compatible for all the organizations and disseminate information as per the requirements of different users.

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