

## Use of XML in HL7

K.S. MANN<sup>1</sup> and PREETI SAINI<sup>2</sup>

<sup>1</sup>CSE & IT Department, GNDEC, Ludhiana (India).

<sup>2</sup>CSE Department, SDDIET, Barwala, Panchkula (India).

(Received: April 28, 2010; Accepted: June 02, 2010)

### ABSTRACT

In hospitals, the ability to send and receive healthcare data including patient information and the various lab reports are required. The information is stored in non standard formats. The information must be converted from one format to another for the transmission. In order to achieve this, all healthcare information must be sent in a specialized health care language. In healthcare, important or mean-ingful data can be easily identified by XML markup or tags and stored as electronic documents. The XML is useful because of its variable length of the nested structures. XML is well-formed document format, it can be easy to be parsed and managed

**Keywords:** HL7, Transmission Wrapper, XML, Base64, DICOM.

### INTRODUCTION

Healthcare organizations and particularly hospitals are changing their operating philosophies to become profitable, enterprise-like organizations. There is need for the multimedia data transfer mechanisms for the healthcare systems today. Large amount of medical data is stored in various BLOBs (BLOB - Binary Large Object), like diagnostic images in DICOM or JPG format, Microsoft Word files or scanned documents<sup>1</sup>. To handle structured and unstructured content provided by documents, reports, images and multimedia objects, the standard interfaces like DICOM<sup>2</sup> and HL7<sup>3</sup> is used.

HL7 is a standard for electronic data interchange in healthcare environments. HL7 prescribes formats for the interchange of information concerning all aspects of the healthcare enterprise, Data sharing among local hospitals is being increasingly realized with the HL7.

#### HL7 messages

HL7 defines that a message is the smallest transferable unit and is comprised of segments. It

begins with the **Message Header Segment (MSH)**. It is identified by the message type and the initiating event segment (trigger event). The HL7v3 message comprises of the medical data consisting of the clinical information of the patient with necessary snapshots and images. The HL7v3 message components are:-

#### Message

A message is the entire unit of data transferred between systems in a single transmission. It is a series of segments in a defined sequence, with a message type and a trigger event. Between text messages in a batch, two carriage returns/line feeds (hex characters 0D0A0D0A) represent the end of each message.

#### Segment

A segment is a logical grouping of data. Segments within a defined message may be required or optional, may occur only once, or may be allowed to repeat. Each segment is named and is identified by a segment ID, a unique 3-character code. The hex characters '0D0A' that act as a Segment Terminator denote the end of each segment.

## Field

A field is a string of characters. Every field has a data type that dictates the structure of the data in that field. The segment the field is in and the position within the segment identify each field. e.g., PID-5 is the fifth field of the PID segment. Optional data fields need not be valued. Whether a field is required, optional, or conditional in a segment is specified in the segment attribute tables.

## Data types

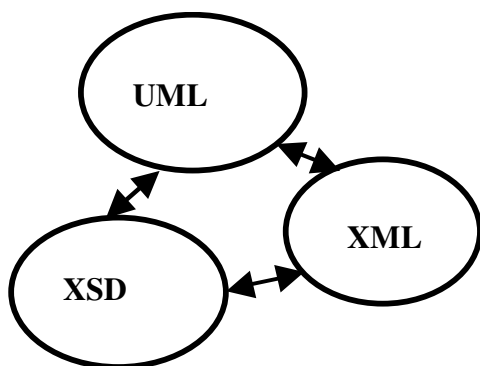
HL7 defines a long list of data types. Some are as defined as a primitive type, while others are defined as a complex type. A complex datatype consists of more than one attribute of the primitive type. HL7 calls the attributes of a complex data type a **component**. Here, the data type uses three components, namespace ID, universal ID, and universal ID type.

## Message Formatting

There are different ways to format the text message and multimedia messages with the use of XML. These are as:-

### 1. XML with UML

Using **eXtensible Markup Language** (XML format of the HL7, message type is defined by XML schema. The HL7v3 use the XML in its information exchanging model.



**Fig 2 : XUM Model**

As XML is well-formed document format, it can be easy to be parsed and managed. XML can be simply serialized through HTTP, SOAP, TCP/IP etc. A XUM(XML UMLmodel)[4] is a model that describes, as both a UML class diagram and an

XML schema, an implementable form of a V3 instance based upon an Static Model. The XUM describes a particular wire format, and is also useful in terms of commercial tools use and ease of implementer understanding.

### 2. Base 64

The binary data can not be sent inline with the XML. To send binary data, the data must be encoded with Base64 standard along with the Xml data structure. This method uses four consecutive ASCII characters to represent three consecutive octets of binary data by way of direct value to character substitution. All the bits in an XML document must be legal characters in legal syntax in the same character encoding as the rest of the document.

### 3. CCR and CCD

These are structured XML standards for clinical information exchange. CCD( **Continuity of Care Document**.) enable greater interoperability or healthcare integration of clinical data and allow physicians to send electronic medical information to other providers without loss of meaning. The CCR standard is a patient health summary standard. It is a way to create flexible documents that contain the most relevant and timely core health information about a patient. The CCR XML schema can be used to define an XML representation for the CCR data elements. CCR thus does not provide a formal mechanism for defining specialized CCR document types (e.g., discharge summaries, progress notes).

### 4. X12

The X12 standards provide structure for the electronic representation of business documents commonly exchanged between companies. XML Converters are able to handle X12.

### HL7 and XML

HL7 is developing XML-based Version 3 messages. These Version 3 messages enhance the usability of HL7 by offering greater precision and less optionality, conformance profiles that will help guarantee compliance, coded attributes linked to standard vocabularies, and an explicit, comprehensive, and open information model. A standard set of DTDs for health-care documents is being developed.

### Parsing The Xml Documents

The XML documents are parsed by two type of parsers:

(1)Event based Parsers (2) Tree based Parsers. The event based parser emphasis on the events. a particular event occur, it will call for the function. In tree based the xml document is converted in the tree structure. a regular expression parser is selected as the parser in the XML parsing modules because the easier the structure of XML parsing modules is the easier to parse them into HL7 message

### Parsing The Hl7 Messge

For HL7 message parsing there are two functions required to be declared, one to handle the element data and one to handle the character data within the elements. The code which reflects the XML file is required to be changed which is to change the element and attribute names.

### Advantages of XML

The XML is useful because of its variable length of the nested structures. The data is human readable form.the parsers are generally available.

### CONCLUSION

The large amount of data is to be transformed . It is still hard to exchange medical clinical information such as discharge summaries

and messages actually. There are Lots of problems between two hospitals which want to exchange medical data by HL7 messages like patient privacy, network security, budget. The more specific message format techniques are required for improving the existing ones. There is need for message reshaping. For now, XML developers will have to explore creative workarounds for supporting binary data in XML documents. There isn't an ideal solution for large binary data files today.

### Future Work

Linked to environmental databases and clinical information from the EHR is going to require new systems architectures and robust, new distributed technologies. The platforms are too cumbersome, too costly, and too used are inefficient to support new environments. HL7 V3 messaging should not have to rely completely on the network for reliable delivery. New technology will have to support high-end processing capability at reduced costs, power, and storage components. Promising new technologies again call on providing horse-power of integration, to create networked integrated components and device technologies needed. The Interactive information management technologies will require business intelligence capabilities to transform information to knowledge for decision Different Components will be neede for converting data, interoperability, and interpretations of data

### REFERENCES

1. Multimedia Content Management with HL7v3 Messages, Miroslav ,Grga Mrkonjic,Stanko Tonkovie,48th International Symposium ELMAR-2006, 07-09 June 2006, Zadar, Croatia.
2. National Electrical Manufacturers Association, 1300 N. 17<sup>th</sup> Street, Rosslyn, Virginia 22209, USA. **NEMA Standards** Publication PS3. x- 1999, Digital Imaging and Communications in Medicine (DICOM), January 1999.
3. Health Level Seven Inc. Ann Arbor, MI. Health Level Seven.
4. Making HL7 Version 3 messages easier to use-A case study in ensuring complex family of standards is fit for purpose.
5. <http://www.hl7.org>, HL7 Inc.
6. HL7 XML Technical Committee <http://www.hl7.org/special/committees/sgml/sgml.htm>
7. base64 formal specifications,from <http://www.ietf.org/rfc/rfc1421.txt>