Automatic RIM (Reference Information Model) Wrapper for LEX: Lifelong Electronic Health Record Based on XML

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INTRODUCTION
The Lifelong EHR based on XML (LEX) project is a pilot project currently under development, whose ultimate goal is to integrate patient data in the Central Clinical Database (CCDB) which can be shared with heterogeneous HIS.

The following paper describes the design and implementation of a software framework that could be used to construct an HL7 message server for the sharing of patient medical information. HL7 is a standard for electronic data exchange in healthcare environments. However, applying HL7 to the existing HIS requires enormous work because almost all Korean hospitals have their own HIS and their own unique combination of interfaces and data structures.

We present solution that requires minimum changes to the existing HIS and is independent of the specific client user application. It is to add an interface engine called HL7 message server to the existing environment.

METHODS
The basic components of our overall architecture shown in Figure 1 consist of the HL7 message server attached to HIS, Patient Record Entry Machine (PREM) and CCDB. PREM has an intermediate role in translating a message to a set of eXtensible Markup Language (XML) documents encoded in ASCII format. CCDB is the integrated database for sharing of patient medical information and access via the Web.

HL7 message server is based on the real-world event that initiates an exchange of messages. We developed an automatic RIM (Reference Information Model) wrapper that automatically links patient data to the appropriate HL7 message components in order to compose messages. It is a class that consists of message type attribute and mapping methods of each message component. In addition we defined two tables for effective message mapping and creation. One is a Unified Integrated Table (UIT) in HIS DB. All data items needed to create a message are integrated in this table by database trigger. The other is the meta-table that maintains the mapping information for each data item of message components. A trigger event happened in the client PC causes a triggering event of HIS DB table to identify the HL7 event and copy all data items needed to create an appropriate message to UIT. At the same time HL7 message server checks data from UIT regularly. If UIT has data, HL7 message server loads UIT in the memory and maps the data items to the appropriate message component with the meta-table and the automatic RIM wrapper. After populating the message, it checks the message for errors. And then it transforms the message to a flat wire string and forwards it to PREM through the TCP/IP Interface.

RESULT
We developed the prototype of the HL7 message server for patient administration system and ordering system. The performance showed that it was able to create 100 messages in a second.

Based on the experience of this project it has been confirmed that the automatic RIM wrapper presents a promising model for the incorporation of messaging modules into existing hospital information systems.