Universal Medical Database

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Abstract – Health Level Seven (HL7®) is a standard for exchanging information between medical information systems. It is widely deployed and covers the exchange of information in several functional domains. It is very important and crucial to achieving interoperability in healthcare. HL7 competencies are needed by all professionals touching information technology in healthcare. This project aims to create an electronic healthcare system which enables a hospital facility/ medical institute or a clinic to create, store, and share medical reports or patient information. The purpose is to electronically send the patient's medical report or data to another medical facility in a very secure manner. We have used HL7 (Health Level Seven) for converting medical data or information which is in English into HL7 format which is an international messaging format that can be again re-converted back into English.

The proposed system is an open and free to use website where anybody can use our tool to convert some medical data or data relevant to the patient who has been admitted or is an inpatient is converted into HL7 standard of format. The advantage of this format is that it is internally standardized and is accepted in all countries. The main thing is that it achieves interoperability.

Keywords: Health Level Seven (HL7), Medical Information System, Interoperability, Healthcare, Patient Information, Electronic Health Record (EHR), Medical Reports

I. INTRODUCTION

A.Introduction

With our project, we have made an attempt to create an electronic healthcare system which enables a hospital facility/ medical institute or a clinic to create, store and share medical reports or patient information. Purpose is to electronically send the patient's medical report or data to another medical facility in a much secured manner.Since it is an electronic system the possibility of losing the data is also overcome since a medical report in paper is always vulnerable to be lost or misplaced.

Electronic Health Record (EHR) improves healthcare decisions by allowing access to the patient's relevant clinical information at the decision-making point. EHR is a distributed system that results from the interactions and cooperation of various independent information systems to achieve a specific healthcare process.Without HL7, there is no interoperability and no EHR. Mainly, in our project we have created a tool which can convert reports/medical data into HL7 format.

B.Motivation of the project

In India, small scale hospitals and clinics make use of physical reports (on piece of paper). There is a need to create a simple EHR (Electronic health record) system. Papers can be misplaced. Hence EHR will prove to be helpful. Sometimes, a report on paper cannot be understood and interpreted. An EHR which is internationally accepted will be understood by everyone to help the Health Community.

C.Problem Statement

In India, small scale hospitals and clinics make use of physical reports (on pieces of paper). There is a need to create a simple EHR (Electronic health record) system. To create an Electronic Healthcare System (EHR) which can

create, store and share medical records or any health related information which is universally applicable and acceptable with ease.

II .LITERATURE REVIEW

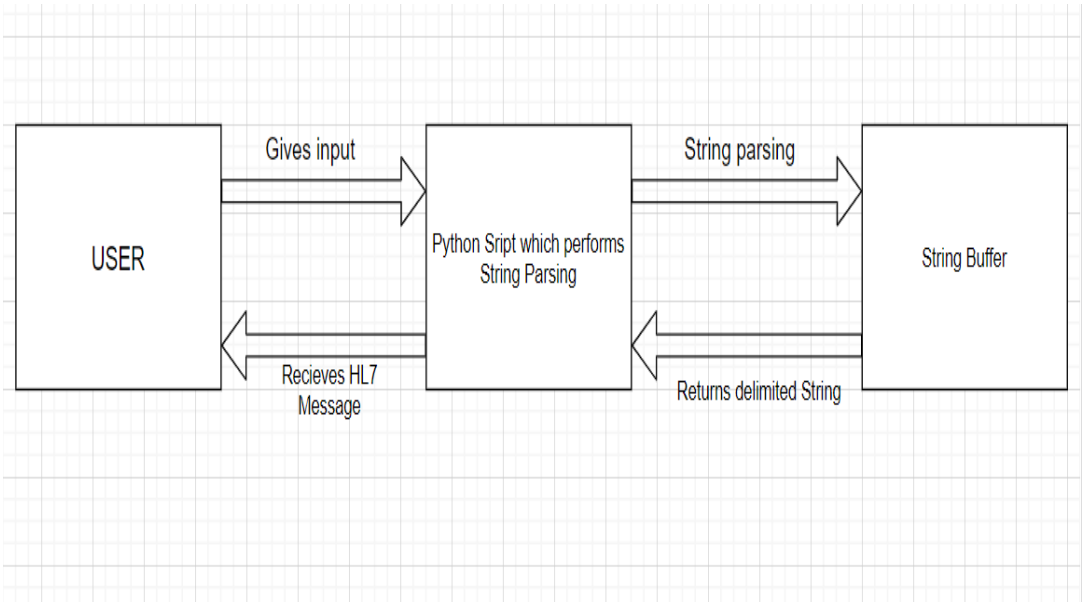
Stefanos A. Nikolidakis et al. in his research he explains about a medical application with which he is able to monitor chronic disease patients in a real time environment remotely. According to the author he combined BASNs with HL7 standards and IMS platform to achieve interoperability with other technologies and to provide quality relationships between patients and doctors. As a future work author is planned to provide performance data of the network to optimize the performance and availability of the proposed system

Luca Mainetti et al. discuss the importance of the ICT technologies in the healthcare domain. In this paper the author proposed a ICT prototype system that is able to support nutritional and medical applications, that are based on EPCglobal and HL7 medical standards. As a future work author has planned to develop a network based on XCA and XCPD standards to allow exchange of patient data among different healthcare communities. According to the author the proposed system is limited to drugs and food allergies, so the system can be extended for tracking biological data coming from the network.

III. SYSTEM DESIGN

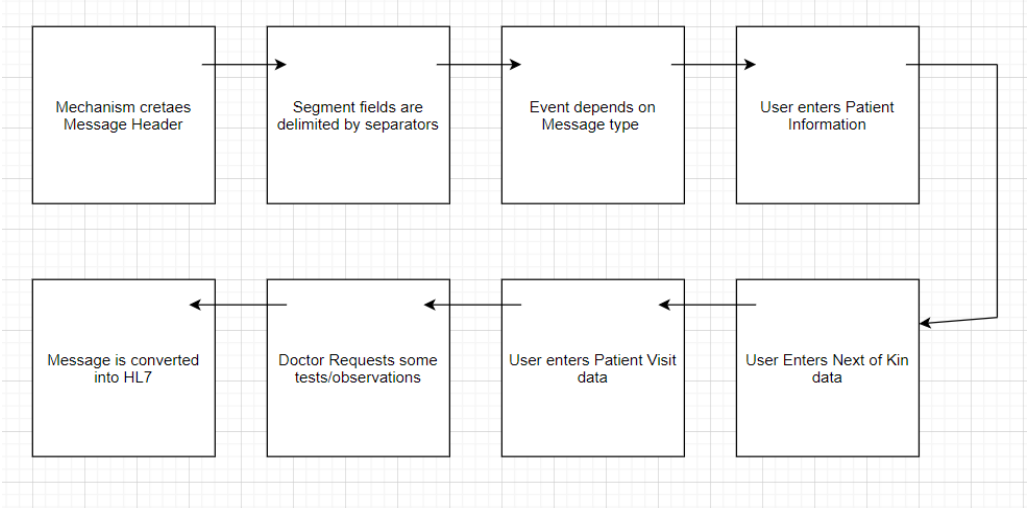
Our project simply aims to convert a medical report to HL7 format. There are 5 segments of information namely PID(Patient Information), NK(Next Of Kin), PV(Patient Visit), DG(Diagnosis Information), OBX(Observation Results). The user has to fill in the form which asks for all the above data for the segments mentioned above. It then converts the report to HL7 format by performing string parsing and manipulation.

It can and should be used by hospital staff to convert medical reports of a patient to the HL7 format because for an instance, a patient visits a hospital in India, gets his medical report and then shifts to some other country. It will be difficult for a doctor of some other country to interpret and understand the Indian report format. Since HL7 is universally accepted, it can be widely used for this purpose.



DATA FLOW DIAGRAM

The above diagram represents the DFD flow of the user's interaction with the form. It depicts the flow of our system.



SYSTEM FLOW DIAGRAM

IV IMPLEMENTATION DETAILS

Methodology Applied:

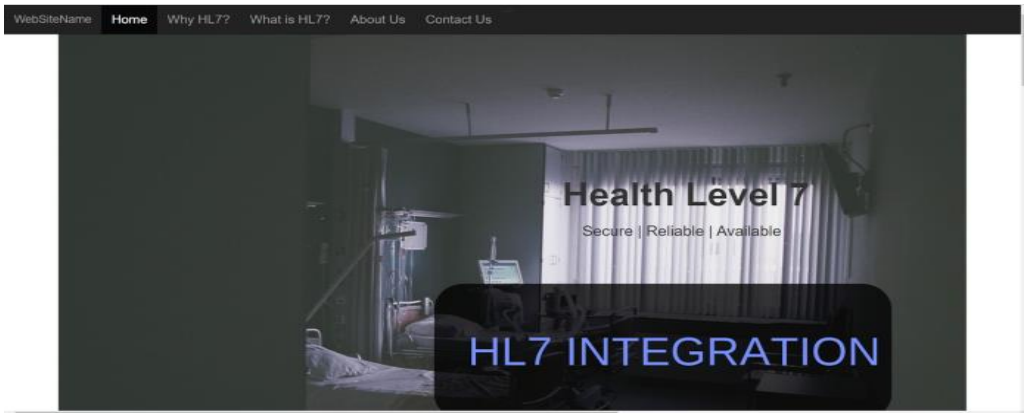
HL7 [or Health Level 7] is a relatively obscure standard that provides most of the system-to-system communications. It allows disparate systems in a hospital environment to speak a similar language. In many ways, HL7 is the glue that allows various hospital systems to interoperate.Here is a sample HL7 Message with proper explanation of the PID (Patient Information) field:

```
MSH|^~\&|SENDING_APPLICATION|SENDING_FACILITY|RECEIVING_APPLICATION|RECEIVING_F
ACILITY|20170613083617||ADT^A01|911576160110613083617|P|2.3||||
EVN|A01|20170613083617|||
PID|1||135769||MOUSE^MICKEY^||19281118|M|||123 Main St.^^Lake Buena Vista^FL^
32830||(407)939-5555^^^ohtoodles@notdisney.com|||||1719|999999999|||
|MOUSETOWN||||||||||||||||
NK1|1|MOUSE^MINNIE|WIFE||||||NK
PV1|1|O|||||^^^^^^^^|^^^^^^^^
AL1|1||^Penicillin||Anaphylactic shock
AL1|2||^Cat dander|Skin rash
```

The above message is a ADT (Admission, Discharge, Transfer) message. There are 5 different segments present in it namely: MSH (Message Header), PID (Patient Information), NK (Next of Kins), PV (Paient Visit), AL (Allergy).

In our project we have used MSH, PV, NK, DG (Diagnostic Information), OBX (Observation Results). The user will fill out the form. There are 5 different segments (mentioned above) which the user has to fill...when he clicks on submit he gets the output as a HL7 message.

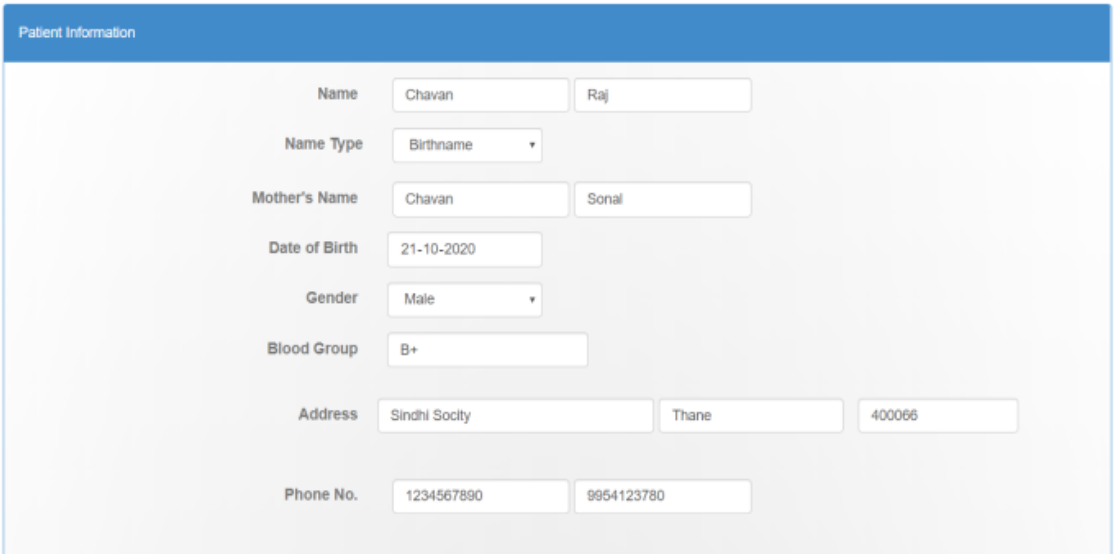
SCREENSHOTS




```
{
  "DG": "|1|Diabities|2020-04-071222|F:Final|M:Medication|Shah^Parth|",
  "MSH": "MSH|^~\\&|HL7SOUP|20200403|1554|ADT|155132|2.5.1",
  "NK": "NK1|1|Patil^Pooja|Friend|Khar nagar^Mumbai|9964517820",
  "OBX": "|1|NM|Body Temperature|99|]DegF]|2020-04-151225|",
  "PID": "PID|Chavan^Raj^Birthname|Chavan^Sonal|20201021|Male|B+|Sindhi Socity^Thane^400066|1234567890~9954123780|",
  "PV": "PV|Inpatient|Accident|New|<Random>|Chadda^Hrushabh^PA|"
}
```


V. Conclusion:

Hence we have created a tool which can convert a medical report or medical data into standardized HL7 format.



Future Scope:

In future we plan to make this tool available to specific hospitals and medical stations.We plan to create logins for hospitals where all the HL7 messages created for that particular hospital will be stored in a database for future reference. We plan to create an Android based System with Database connectivity.

REFFERENCES:

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