MEDILIG

Medical Life Guard: An XHR Software Platform

An Introduction

By

Athanassios I. Hatzis, PhD

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Preface

MEDILIG is the mature product of personal work aroused from both the development of legacy EMR systems on the field of neurosurgery and my research on the design and implementation of EHR systems. It took me years to arrive at this point and demonstrate an open system for the community of users and developers.

Resources for that work were very limited and apparently the last year I was fully engaged with this project to make that dream a reality. Thank God I had the support of my wife and family that realized how important that work was for me. I would like to dedicate the fruits of my labor to my wife Panajota and my two children George and Christianna so as to express them my gratitude. The kick-off of this open public project would not become true without their patience and understanding, as well as their encouragement to continue it.

I also release this project to the public with the hope that some will find it useful and others will be inspired to continue working along the same principles. The date of release, 25th March, a national and religious holiday in Greece, has been chosen on the right moment to signify freedom and independence: freedom of health professionals from the bonds of vendors and independence on the design and implementation of health information systems.

25th March 2010

Celebration of Hellenic Independence Day

Commemoration of the Annunciation of Most Holy Theotokos

Ikos 9 – Akathist Hymn

We see most eloquent orators mute as fish before Thee, O Theotokos; for they are at a loss to tell how Thou remainest a Virgin and could bear a child. But we, marveling at this mystery, cry out faithfully:

Rejoice, receptacle of the Wisdom of God:

Rejoice, treasury of His Providence!

Rejoice, Thou Who showest philosophers to be fools:

Rejoice, Thou Who exposest the technologist as irrational!

Rejoice, for the clever critics have become foolish:

Rejoice, for the writers of myths have faded away!

Rejoice, Thou Who didst rend the webs of the Athenians:

Rejoice, Thou Who didst fill the nets of the fishermen!

Rejoice, Thou Who drawest us from the depths of ignorance:

Rejoice, Thou Who enlightenest many with knowledge!

Rejoice, ship for those who wish to be saved:

Rejoice, harbor for sailors on the sea of life!

Rejoice, Thou Bride Unwedded!

Introduction

Let us make the assumption that you are either someone with a technical background, e.g. a software developer, or someone with a medical background e.g. a doctor. Furthermore perhaps you arrived here because you are looking for free software to do your research/clinical study, to organize you clinical data, to manage patients records and so on. Welcome aboard, MEDILIG is designed to cover needs for both groups of users with technical as well as no-technical background since minimal effort is required.

Definitions

First, let us explain the acronym of this project. MEDILIG stands for 'Medical Life Guard' or if you prefer 'Medical Diligence'. The author of the present work generated this term for an FP7 proposal called Neuro-MEDILIG one year ago. A recent Google search resulted to only 173 links that contain this term and this was due to the previous use of the term.

Secondly, we would like to refer to the term XHR which is also a newly invented term by Scott Shreeve. XHR is used here as a collective term to all previously defined terms in the field of medical informatics such as EMR (Electronic Medical Record), EHR (Electronic Health Record), CCR (Continuous Care Record), PHR (Personal Health Record) and others. Therefore, MEDILIG definition is the following:

MEDILIG – Medical Life Guard: An XHR cross-platform software for the design, implementation and use of autonomous, open, database models for multilingual medical knowledge management systems from primary care to continuing care.

Health Information System (HIS) Architecture

There are many reasons that we decided to build a new open project for what is usually called HIS rather than using an existing one from the open source software web repository. We believe that you will choose to work with MEDILIG for the same reasons.

Our main motivation to start this work was the search on internet to find open relational database models for the design of such systems. We searched Google with terms such as (EMR "database design") and (EHR "database design") and the engine came up with about 6000-7000 results. Change that to (EMR/EHR "database model") and you are limited to less than a thousand web pages. We also downloaded, installed and tested most of the available open source or shareware software to examine the design of their database to store data. Finally, we made a thorough research on documents from authoritative sources, e.g. HL7 for interoperability standards in medical informatics as well as relevant journal/conference publications on this topic. The

impression we are left is that there is a big gap between functional guidelines for the design and implementation of HIS and the already implemented open systems that exist out there. In our opinion, there is hardly any open software platform to clearly distinguish among the different layers of HIS e.g. presentation layer, business-logic layer, data-access layer. The focus is on the functional specifications of the system on the whole and the guidelines on how to create certified medical software, but little or no attention is paid on the data-access layer.

We were more surprised when we narrowed our search to the design of relational database models on health information systems. Proprietary systems design is usually locked from the user and such information is generally considered to be disclosed for the public use. On the other hand, there are several open source and shareware software that have a very rudimentary or elementary design of a relational database model that serves the presentation layer, i.e. graphical user interface, and all their effort is clearly on the meaningful use of the second rather than the first.

Dozens of vendors are selling or marketing products all of which use different database schemas. As far as we know there has not been a design and implementation of standard XHR database models for interoperability purposes. We made an attempt to define and use such a generic schema for the start of this project. This data access layer serves also as a domain model and together with the necessary set of business rules defined from the entity relationships is the foundation of our software platform.

The existing implementation of MEDILIG is a single tier or two-tier system in a traditional client/server computing environment. As a starting point for the presentation layer we used Microsoft Access, the most popular and easiest to use relational database with a rapid application development environment for building complex graphical user interfaces. Microsoft Access will run on the client. For the data-access layer we used again one of the most popular, resilient, and easy to manage relational database management systems that comes also with a free license, it is the Microsoft SQL Server Express Database. SQL server may run either on a client machine or on a dedicated server.

Future Studies

We envisage the implementation of this XHR database model using object-relational or post-relational database technology. There are going to be versions of it running on Oracle or MySQL RDBMS. Regarding to the presentation layer we would like to see it expand on n-tier systems using service oriented architecture and the latest web technology such as Silverlight and Adobe Flex.

We are also very keen on the role of Semantic Web and the interoperability with existing database management systems and enterprise content management systems. MEDILIG can be a test bed for experimentation of computational tools and networking components.

MEDILIG will allow the rapid development (RAD) or testing of health information system prototypes aiming to bridge the gap between research institutions, health providers and information

communication technology (ICT) vendors. We believe that well organized social networks as they are formed nowadays on the internet have the power to make miracles become true.

Whether you belong to a research group, or you are a health professional; if you come from an educational environment or you are an IT professional; we hope that MEDILIG can be of great assistance to you and that you may find time to contribute new ideas, software tools and experimentation methods for this project. We are especially interested in solutions that you will come up with by using MEDILIG so that others learn by example.