**IMPLEMENTATION**

**MODULES:**

* Construction of System Environment
* The CDA Document
* Construction of a Cloud Computing Environment
* Integration of CDA Documents via Our Cloud Server

**MODULES DESCSRIPTION:**

**Construction of System Environment**

* In the first module we develop the Construction of the System Environment to prove our proposed system model. In this module we develop Hospital A, Hospital B, Doctor, Patient/User, Admin and Cloud Modules.
* In Hospital A, we create the User Authorization with Login Credentials. This module provides the option of Upload the Patient details as XML File in the Cloud with Encrypted and also provides the option to check the status of the uploaded file with the XML Format. The same is followed in the Hospital B too.
* In the Admin part, we provide the Admin Authorization with login Credentials and view pending request of users and doctors. The admin only give Approval to the request by sending secret key to user/doctor to access the file.
* In cloud Login, view the patient details in the XML format which is acquired from CDA.

**The CDA Document**

* In this module we develop the CDA document. The HL7 Clinical Document Architecture Release 2 (CDA R2) was approved by American Nation Standards Institute. It is an XML-based document markup standard that specifies the structure and semantics of clinical documents, and its primary purpose is facilitating clinical document exchanges between heterogeneous software systems.
* A CDA document is divided into its header and body. The header has a clearly defined structure and it includes information about the patient, hospital, physician, etc. The body is more flexible than the header and contains various clinical data.
* Each piece of clinical data is allocated a section and given a code as defined in the Logical Observation Identifiers Names and Codes (LOINC). Different subcategories are inserted in a CDA document depending on the purpose of the document, and we chose the Continuity of Care Document (CCD) because it contains the health summary data for the patient and it is also widely used for interoperability.

**Construction of a Cloud Computing Environment**

* In this module we develop the Cloud computing environment. We use DriveHQ Cloud Service provider to upload our files in the Cloud.
* In this module, we develop the construction of a Cloud Computing Environment and how multiple CDA documents are integrated into one in our CDA Document Integration System. The standard for this is Korean Standard for CDA Referral and Reply Letters (Preliminary Version). Templates which generate a CDA use CCD part of Consolidated CDA which is released by ONC and made by HL7. However, an actually generated CDA has a form of CDA Referral and Reply Letters.
* The rationale for CDA document integration is as followed. When CDA-based HIE (Health Information Exchange) is actively used among hospitals, the number of CDA documents pertaining to each patient increases in time. Physicians need to spend a significant portion of their time on reading these documents for making clinical decisions.
* At a hospital, the CDA documents to be integrated are processed through our CDA Integration API. The CDA Integration Interface relays each CDA document sent to the cloud to the CDA Parser, which converts each input CDA document to an XML object and analyzes the CDA header and groups them by each patient ID. The CDA Document Integrator integrates the provided multiple CDA documents into a single CDA document. In this process, the data in the same section in the document body are merged.

**Integration of CDA Documents via Our Cloud Server**

* We integrated multiple CDA documents of patient referrals and replies by using the API at our server. The use case scenario and patient data used for integration are shown in this module.
* We adopted sample patient data provided by the US EHR Certification Program, Meaningful Use. The data does not pertain to an actual person. It is fictional, and available for public access. This module is to show how a client integrating multiple CDA documents by using our API. The sample many clinical documents are shown to be successfully integrated.