

SHOWCASING THE MODELLING APPROACH: THE UNIFIED DEVELOPMENT FOR LAND RECORD INFORMATION SYSTEM

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ABSTRACT

The heterogeneous nature related with the analysis & development of the information systems combined with the complexity associated with the technologies used for these, has given a serious thought for the streamlining of these life cycle processes. This paper presents the unified modelling approach, which can be used for the modelling and implementation of the information systems. It showcases the case study of the Punjab State where the development of land record information system is going in its implementation stage. The paper highlights the various aspects related with the information system, modelled using UML framework. The concept is elaborated by the various types of Unified modelling language diagrams, which have been applied for designing (modelling) this system. The Farad centres established for this information system (I.S.), their network design and the combined flexibility of software integrated with the working of the revenue officials (manpower deputed at LRIS) forms the framework; leading to highly flexible modelling design. The modelled diagrams can form an easy and concise description; for whenever the need arises for the further software life-cycle development or integration of the required resources (showcased in UML diagrams) of the information system with the latest tool and technologies (technological enhancements).

Keywords: UML tool, ICT, E-governance, Information system, Rational Rose.

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1. INTRODUCTION

Information and communication technologies (ICTs) have a significant role in revolutionizing the work of e-Governance applications, being projected as significant projects in every part of India. With that, the main change is in the day-to-day life of common citizens, who are part of such e-initiatives. “E-Government” refers to usage of information technologies (Internet or mobile applications) by government administrative initiatives (projects) for the overall productive development of citizen-centric services. At various stages of history, the level of technology played a significant role in devising the modalities for the development of the information systems. UML is a widely accepted and supported standard software modeling language. Unified Modeling Language (UML) notation and UML modeling techniques can support the analysis and design phases in the development process of Web applications. UML stereotypes are specified for navigational and presentational model elements according to the mechanisms for standard extensions defined in the UML [2].

2. HISTORY

The Punjab Government through Punjab Land Records Society (PLRS) has entered into an agreement with M/s CMS Computer Limited for providing citizen services under Integrated Land Management System (ILMS) project at 153 Tehsils/Sub-Tehsils in the state of Punjab. Existing governments Web sites provide customers with access to government information, allow simple transactions, and provide links to other relevant agencies. But it's clear that e-Government is no longer just about webifying government agencies. The imperatives are to re-engineer enterprise processes across agencies, to integrating disparate systems and applications, and to provide secure and responsive access to citizens and businesses. The e-government movement is being driven by the need for government to: Cut costs and improve efficiency, Meet citizen expectations and improve citizen relationship & Facilitate economic development [5]. The ILMS covers comprehensive services of Land Records and Registration of Documents in a seamless manner under Public Private Partnership (PPP) Model. This project envisages first the data entry of all the seven registers of the Patwari, updating of the records to the current level, and thereafter, providing land records related services to the citizens through the Farad Kendras. The second part of the project includes the computerisation of the processes of the Sub-Registrar office located all over the State. This includes scanning of the documents and fingerprint, taking digital photograph and registering the document. With the completion of this project, the people of Punjab would be relieved of the complications of the land holdings in the State. Total land records would be updated and

litigation could be minimized to a certain extent through this transparent and people friendly prestigious project.

The land records system and registration system would be integrated in a seamless manner at a single platform, later-on. The implementation of the project has been done on Public Private Partnership under BOOT model. The private partner shall bring in the infrastructure, manpower and IT equipment to maintain and operate the project for the period of five years. The software for the project has been provided by the PLRS for which M/s Microsoft India Pvt. Ltd. has been selected as the Technology Partner. The private partner is M/s CMS Computers Ltd., which is leading IT Services Company in the e-governance space. The company has successfully implemented similar projects like KAVERI, e-Seva, e-Suwidha, e-Mitra and Bangalore-One in other states in India.

3. IMPORTANCE OF COMPUTERISATION OF LAND RECORDS

In the statistical data pertaining to the Census-2011 of state of Punjab as completed by the directorate of census operations (Punjab), the total villages in Punjab are 12,568. The farmers, which constitute 70% population of Punjab, can get copy of the land record from either the Farad kendras, established at the district, tehsil or sub-tehsil level or at the click of the mouse, sitting at home and without the intervention of the revenue officials such as Patwari or kanungo. Thus, the farmers are saved from the hassles of the revenue officials. Beynon-Davies[9] argues that, the worth of an IS will be determined in the three contexts of functionality, usability and utility.

The computerization of land records is seen as a revolutionary step, as part of administrative reforms to eradicate corruption from the public dealing seats, related with various government departments.

- a) The main benefit is that it will be a hassle-free process with the common citizens of the district (tehsil/sub-tehsil) be no longer required to shuttle between offices of various revenue officials.
- b) It will lead to corruption-free environment as common citizens will not be required to shell out extra money to grease palms of revenue officials.
- c) Records will be accessible online for the public for any-time, any-where (24x7) transactions.
- d) The total mutations in the state being running into lacs; the record for jamabandis, girdavaris and mutations have been put online on the PLRS website. There would be ready availability of the land records in connection with jamabandi (farad-ownership),

girdavri (possession) and mutation (transfer of property) besides searching records according to Khewat and Khatauni number. Anyone can get the details of the revenue records on the basis of name and address.

- e) Any farmer or client can check for the transparency of his revenue record (farad, etc.) and can have the hard or soft copy of the record, sitting anywhere in the world.
- f) The availability of land records being available in digital form, also lead to reduction in the overall legal (court) cases related to the rights being claimed as a part of inheritance and now, the rights being claimed only by the legal persons.

4. HARDWARE/SOFTWARE SUPPORT

The software used for showcasing the unified modelling development approach for the implementation of land record information system is Rational Rose enterprise edition version 2003. Rational Rose is a powerful visual modeling tool to aid in the analysis and design of object-oriented software systems. The Unified Modelling language(UML) has been used in the Case tool, Rational Rose for showcasing the development of e-governance project, related with the functioning of the land record information system used by PLRS.

At the Farad centres: The technology used for the establishment of Farad centres (for revenue department) in the state of Punjab in India is Microsoft .NET technology(MS.Net) with back-end (RDBMS) used as SQL Server platform. The Operating System used is Window Server/2003.

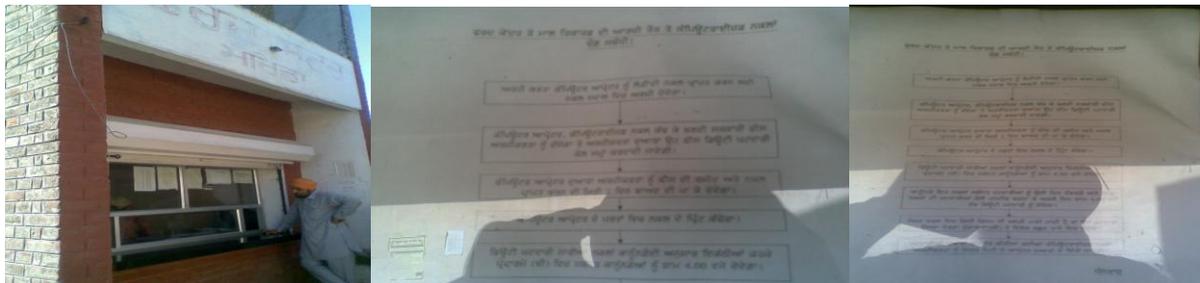


Image 1: Farad centre at Morinda

The farad centre (working) at Morinda city (Tehsil: Chamkaur city), Punjab state is shown in the Figure 1 above.

5. DESIGNING & MODELING WITH UML DIAGRAMS: CASE STUDY OF E-GOVERNANCE

5.1 Designing with UML notations

As defined by Grady Booch, “The UML is a language used for visualizing, constructing and documenting the artifacts of a software”. UML has the following components (main

diagrams): use-case diagram, class diagram, activity diagram, sequence diagram, component diagram, collaboration diagram and deployment diagram. These diagrams are used for the system modeling. The case study of Punjab state has been taken for the detailed study of the land record information system. Unified Modeling language (UML) has been used for the detailed analysis and modeling of the information system, pertaining to the revenue records of the state, such as land records. UML Data Modeling Profile [8][4] was proposed by Rational Software from IBM. The use of Data Modeling Profile for the UML has helped open the UML to database design [11].

5.1.1 Use-Case Diagram

In this section, we make use of UML Use Case diagrams to describe the relationship among the diverse use cases specified for the application and the actors who interact with the application according to those use cases. Use case diagrams describe what a system does from the standpoint of an external observer [12].

- a) In the Fig.1 use-case diagram, Farad Centre at each district form the interface and tehsil/sub-tehsil level at the state level consist of data entry operators: Front-end operators (FEO) and Back-end operators (BEO). The front-end operators work at the front-desk counters and are interactive with the clients, who are coming at the Farad centre for receiving land records. The back-end operators work at the back-end (SQL server) for the maintenance and updating of data. ASM (Assistant System Manager) work at the district and tehsil level whereas DSM (District System Manager) coordinates and controls all the operations of the Farad Centre at the district level. ASM provides data record and takes backup of the operations (data processed) at the server and passes that to DSM. The record is also passed for the replication at the main server located at the Punjab land record society (PLRS) at Jalandar (Punjab).

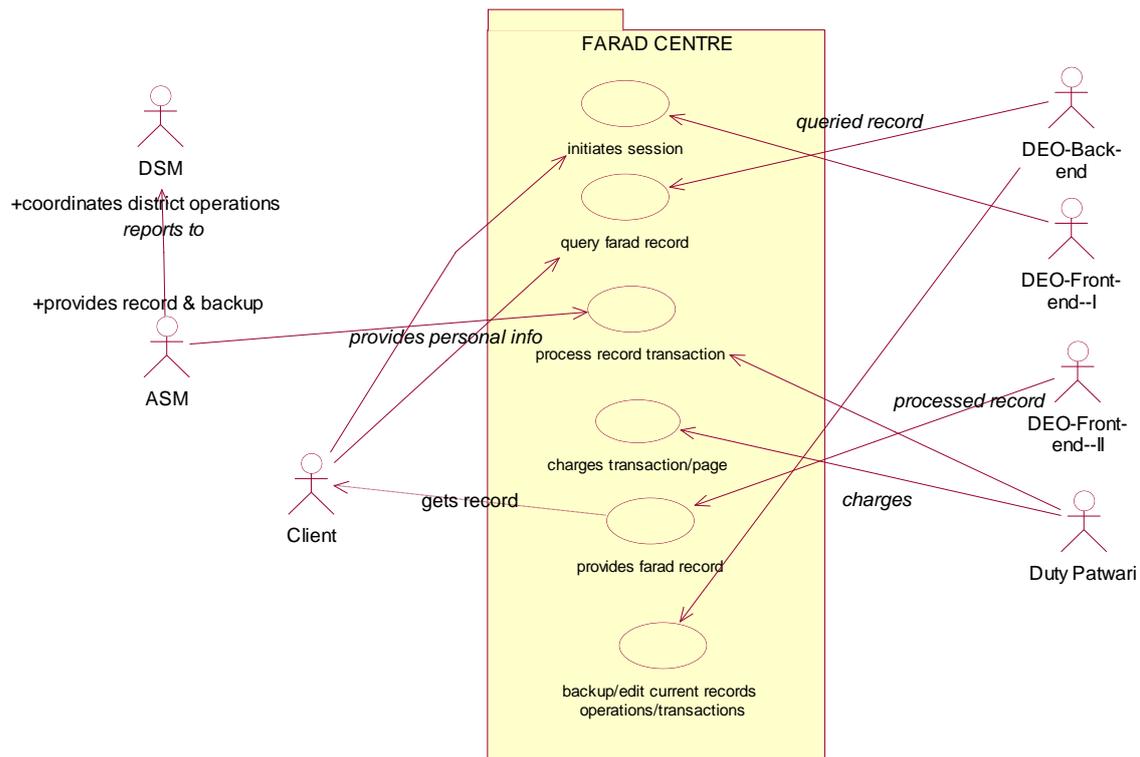


Fig. 1: Use-case diagram of Farad Centre

Client comes at the Farad centre and provides personal info at the counter. DEO-I at the front-end initiates the session while DEO-I at the front-end maintains backup and manipulation of the transacted data (operations). Duty patwari processes the record transaction and charges record/page. DEO-II (front-end) processes record and provides farad record to the client

- b) In the Fig2, the copy of the backup data of district data centre (DDC) is sent to PLRS by DSM, as provided by ASM (In charge of the Farad centre at tehsil/sub-tehsil level). DSM (District system manager) directly reports to Director, Land records (DLR). ASM validates the record updated by DEO at the back-end and maintains backup operations at the farad centre. DEO-I (front-end) perform all the SQL-query operations, queries the required personal data from the SQL server and validates users coming to the farad centre. Then, passes the queried record of the client to the DEO-I (front-end), who in turn passes record to DEO-II. DEO-II passes the hardcopy of the queried record to the duty patwari. Duty patwari validates (signs) the record and passes on to the DEO-II at the front-end. DEO at the back-end updates the records and sends for validation to the Halka patwari. Halka patwari maintains Jamabandi (land)

record for the up-to-date records. This jamabandi register is updated after every 4 years.

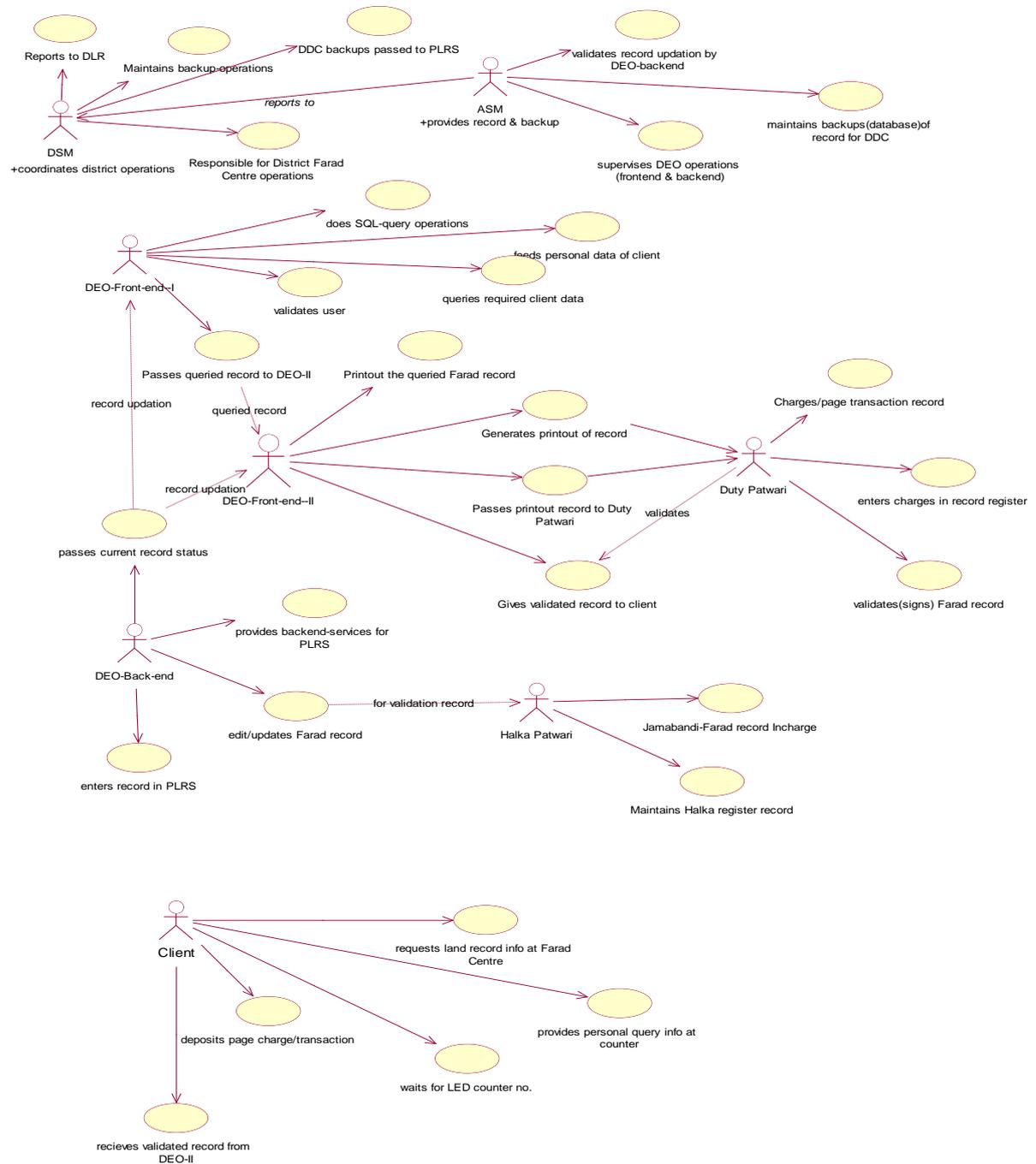


Fig. 2: Use-case diagram of Farad Centre

Client requests for the land record information at the farad centre at tehsil/sub-tehsil level. For this, the client first provides personal information required to the data entry operator at the counter. He then gets id-no. of the required record and waits till the client id-no. is

displayed at the LED counter. Then, he deposits the page charges according to the transaction and receives validated land record from the DEO-II (front-end) at the farad centre.

5.1.2 Collaboration Diagram

The Collaboration diagram shows the required interaction between the objects in order to perform some functionality of the system.

The collaboration diagram (Fig. 3 and Fig. 4) shows that DEO-I (front-end) sends the command and the database record is searched at the back-end (to be retrieved from the SQL server). The validated record, after the client deposits transaction charges/page, is passed on to the client.

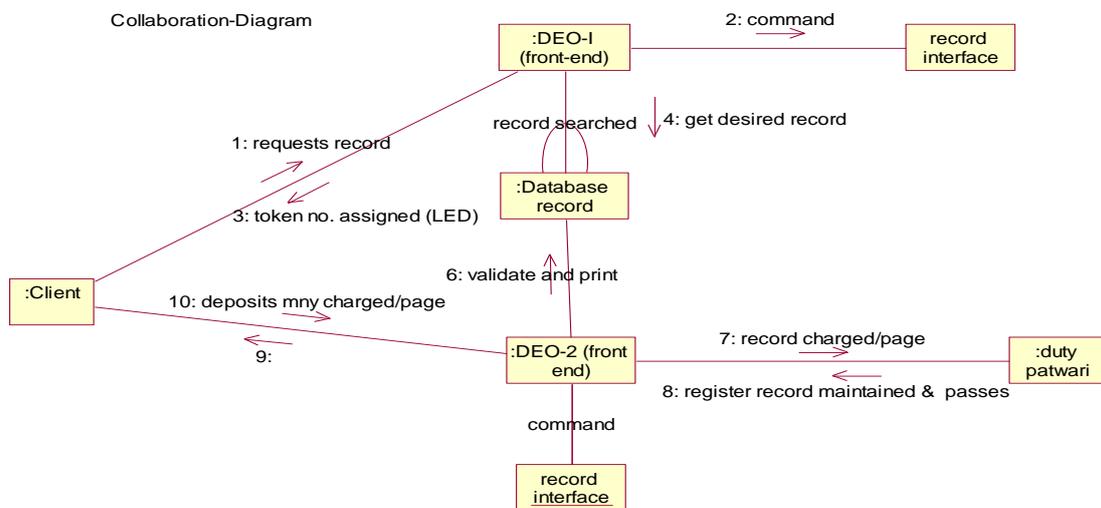


Fig. 3: Collaboration diagram showing the record interface

b)

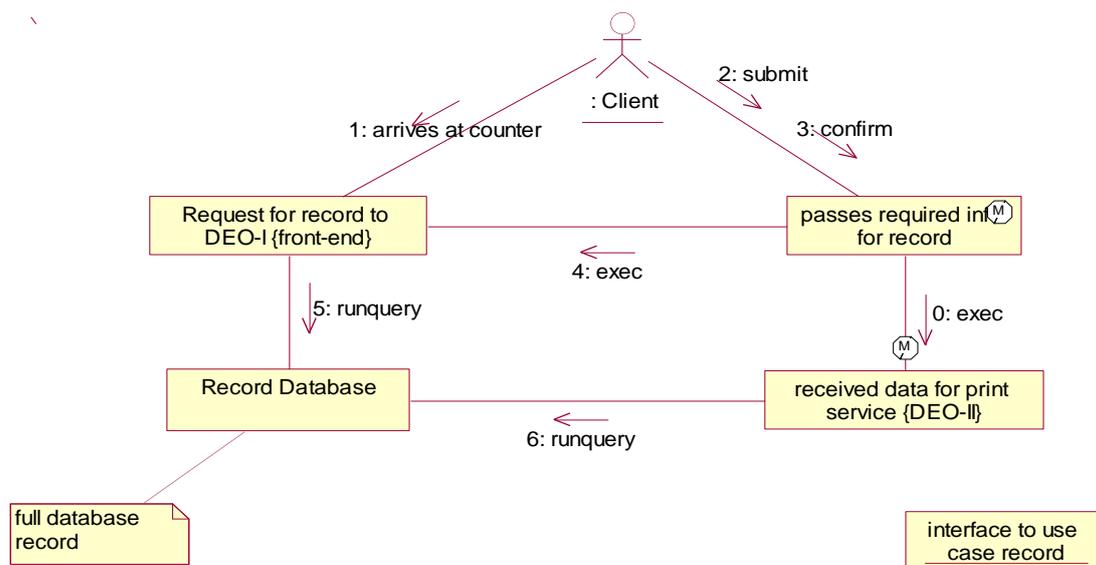


Fig. 4: Collaboration diagram showing client's interaction

5.1.3 Sequence Diagram

Sequence diagram has been used to clarify the core of the interactions between system objects. Figure 5 shows the details of the farad centre mechanism from the moment the client presents the personal information on to the data entry operators(DEO) and then, from passing of the record to the charging it by Duty patwari & then, passing it back to the client after validation and authentication of the record by revenue officials.

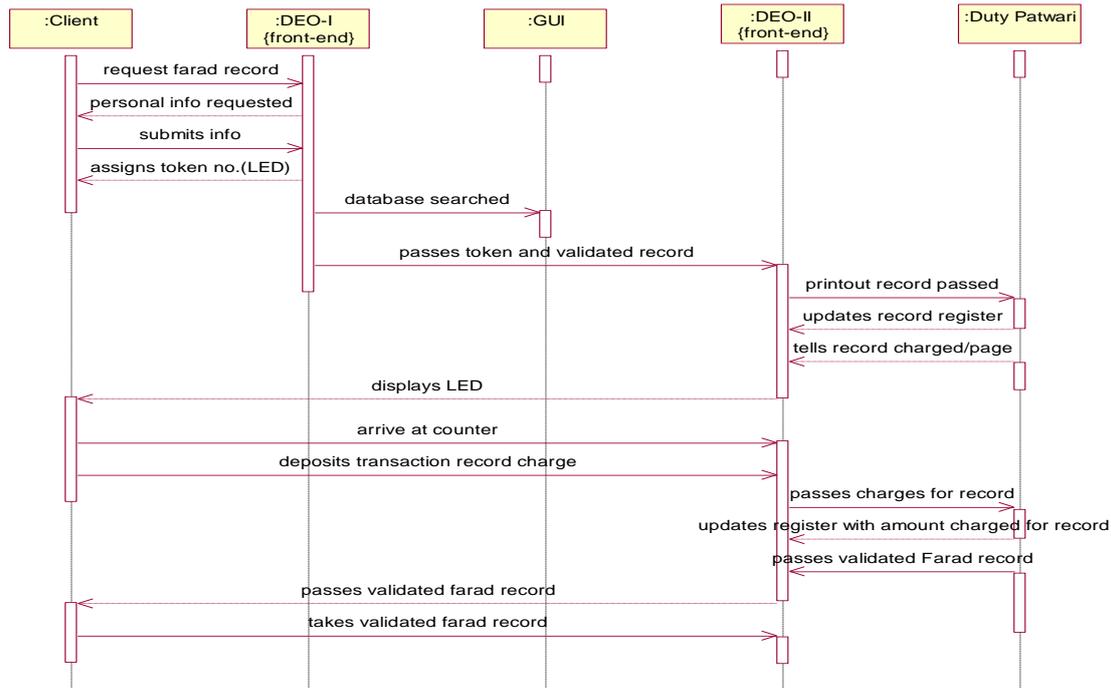


Fig. 5: Sequence diagram showing operations in sequence, from source to destination

5.1.4 Deployment Diagram

Deployment diagrams illustrate the physical distribution of a system. *Connections* are physical links between processors and other processors, devices and other devices, or processors and devices.

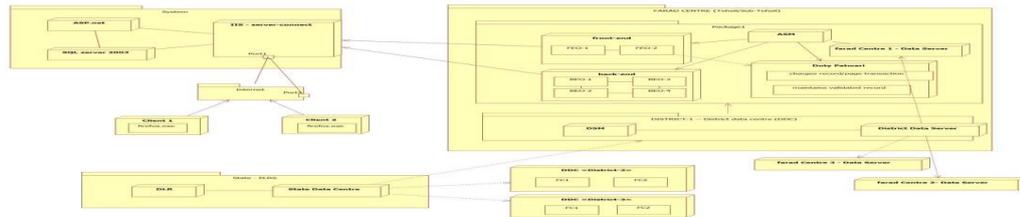


Fig. 6 Deployment diagram showing server connectivity

Fig. 6 shows the Farad centre at tehsil/sub-tehsil connected to the district server, which are further connected to the PLRS at Jalandar.

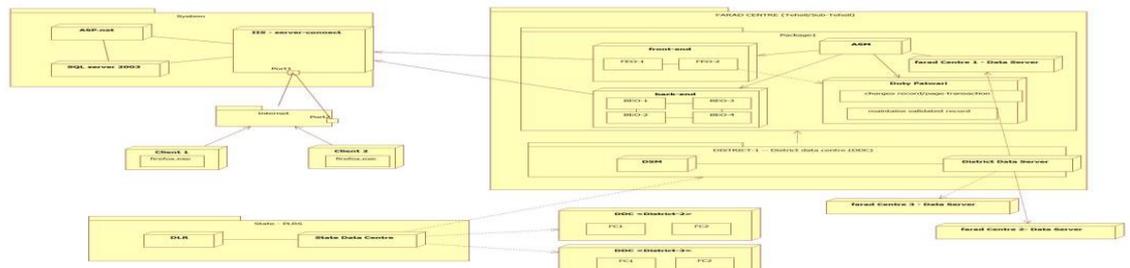


Fig.7 Deployment diagram of PLRS server connectivity with District data servers

6. CONCLUSION

In this paper, the various diagrammatical aspects of the unified modelling language have been shown according to the UML standard extension mechanisms. With the working of the existing Case tools needing to be more specific, UML can really make a big difference in the application development aspects of the real-time web applications; particularly the e-governance applications. The appropriate tools and technologies showcase these models supporting analysis and design of Web applications. Thus, this Unified Development Process describes the requirements capture, analysis, design, implementation, maintenance as well as

the project management and quality control workflows. We believe that this approach will provide end-users and developers with a unified view of the whole information system.

Future work will focus on the developing application-based scenarios in UML for E-governance projects, ICT enabled infrastructure, web-interactive applications and mobile application development. By using the various modelling dimensional aspects of unified modelling language, new methods can be constructed, visualized and documented for the current development related with mobile applications.

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